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RESEARCH ARTICLE

HOMOEOPATHY IN DIABETIC KETO-ACIDOSIS

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ABSTRACT

Diabetes have three types. Type 1 diabetes, Type 2 diabetes & Type 3 diabetes. The current article deals with all the Types of diabetes. All these three types affect the metabolism of the body negatively through Keto Acidosis. Gradually, the common man is getting aware about the emerging metabolic issues in diabetic individuals. This is 'Diabetic Keto Acidosis' or the cross-cutting phenomenon in all the types of diabetes. When the diabetes affects the brain, it is called 'Diabetic Encephalopathy' or Type 3 diabetes.

The article discusses the History, Patho Physiology, Epidemiology, Burden of the disease in India. Thereafter, the article explores the role of Homoeopathy of the AYUSH ministry in dealing with the problem. The article gives a suggestive treatment protocol based on Homoeopathy.

Finally, the article focuses upon the 'cost effectiveness', 'clinical effectiveness' & 'zero side effects' qualities of Homoeopathy. Hence, its use on a mass scale to deal with the ensuing diabetic related Keto Acidosis is discussed at the national level.

KEYWORDS: Type 1,2,3 diabetes, Homoeopathy, Keto Acidosis, NFHS, Miasms.

INTRODUCTION

Diabetic Keto Acidosis (DKA) is characterized by uncontrolled hyperglycemia, metabolic acidosis and increased body ketone concentration. It is a life-threatening complication of diabetes & is usually seen in patients with Type 1 diabetes mellitus. [6]

There has been increasing awareness about the importance of type 1 diabetes (T1D) globally. Diabetic Keto Acidosis (DKA) is a life-threatening complication of T1D in low-income settings. Little is known about health system capacity to manage DKA in low- and lower-middle income countries (LLMICs). As such, we describe health system capacity to diagnose and manage DKA across nine LLMICs using data from Service Provision Assessments. [13]

The concept of elevated blood glucose levels manifests in the body in two ways. These are serum glucose & blood glucose. Serum glucose levels are typically 10-15% higher than blood glucose. The difference arises because when all the blood cells are removed from the sample blood, we get the liquid part, the serum. This is the first concept to keep in mind when considering serum or blood glucose levels. [1,2,5.19,20]

The next concept is regarding the role of the kidneys in managing glucose. Usually, kidneys filter fluids. This filtrate contains minerals such as potassium, magnesium, calcium & trace amounts of proteins & glucose. Normally, nearly all the minerals & glucose are reabsorbed into the blood stream. In diabetic individuals, when glucose levels are high, the glucose transporters in the kidneys become overwhelmed. During this overwhelming process, excess glucose remains in the urine instead of being reabsorbed. The healthy threshold for glucose is typically around 160 milligrams per deciliter of filtrate. Any glucose level that is greater than the healthy threshold starts appearing in the urine. [1,2,5,19,20]

As glucose is present in the urine, it exerts an osmotic effect that attracts water, sodium, potassium & other electrolytes. This process results in excessive thirst, frequent urination that are known as polydipsia & polyuria respectively. However, glucose in the urine or glycosuria does not indicate diabetes. There are situations in which glucose appears in the urine yet the individual is not diabetic. [1,2,5,19,20]

These conditions are genetic abnormalities that involve the SGLT2 (Sodium Glucose Co-Transporter 2) gene. Here, sodium glucose pumps are abnormal & do not do well even at healthy glucose levels that lead to glycosuria without diabetes. Another condition is Falconi syndrome which is a chronic renal disease in which glucose transporters & reabsorption functions are affected. In chronic renal disease, glucose, potassium, magnesium, calcium & proteins are not reabsorbed. [1,2,5.19,20]

As these are not reabsorbed, all these ionic levels will go down in the blood that causes related issues. During pregnancy, the Glomerular Filtration Rate (GFR) in the kidneys increases. This enhanced filtration results in glucose appearing in the urine. However, the presence of glucose in urine during pregnancy does not necessarily indicate diabetes. In such cases, blood glucose tests are typically more reliable for diagnosing diabetes. [1,2,5.19,20]

KETOACIDOSIS

In diabetic individuals, the presence of Ketones in the blood & urine can occur due to insufficient Insulin, the hormone that prevents glucose from entering cells for energy. This condition prompts the body to rely on alternative energy sources such as liver fat breakdown or Lipolysis & Gluconeogenesis that leads to the production of Ketones. Besides Ketones, AcetoAcetic acid & Beta Hydroxy Butyric Acid are also produced. [1,2,5,19,20]

Ketones are acidic substances & can lead to Diabetic Keto-Acidosis (DKA) that shows up through dehydration, acetone breath that gives a fruity odor on the breath, dry mouth & extreme thirst. Ketones increase in the blood & urine thus contributing to osmotic diuresis. This osmotic dieresis leads to excessive urination & further dehydration. Conversely, ketones behave like glucose in the body & their increased presence in the blood leads to other complications. High ketones cause a drop in potassium, magnesium, calcium & phosphate levels in the blood. The drop in these electrolytes results in electrolyte imbalances. [1,2,5,19,20]

Ketones are acidic & contribute to metabolic acidosis & bind with blood proteins. The essential protein, the albumin is the protein that is affected by binding. Albumin has key role in the body like transporting substances. As ketones attach to albumin, they impair normal function thus disrupting the body's processes.

These disruptions lead to variety of symptoms like confusion, disorientation & unconsciousness. [1,2,5,19,20]

In DKA individuals, as a response to metabolic acidosis, they hyperventilate to remove excess carbon dioxide from the body while attempting to compensate for the acidosis. The compensatory hyperventilation leads to symptoms like frequent urination, excessive thirst, dehydration, confusion & disorientation. [1,2,5,19,20]

Clinically, a patient's ketone level warrants further investigation when the level reaches 0.6 millimoles per litre or higher. If the levels exceed three millimoles/litre, hospitalization becomes essential. In type 2 diabetes, DKA can develop due to factors such as incorrect insulin administration, using the wrong injection pen & poor dietary habits. [1,2,5,19,20]

DKA diagnosis is based on the bio chemical triad of ketonaemia, hyperglycemia & acidaemia. [7]

EPIDEMIOLOGY OF DIABETES & DIABETIC KETOACIDOSIS

The second largest numbers of diabetics are Indians across the globe. It is estimated that over 74 million Indians were diagnosed with diabetes in 2021. The trend says that it is expected to rise to over 124 million by 2045. From among all the diabetics, Type 2 diabetes accounts for over 90% of all diabetic cases in India. [3]

The health ministry of India indicates that around 101 million people, comprising 11.4% of the total population currently have diabetes. Further, 136 million people or 15.3% of the total population may have pre-diabetes. These pre diabetic cases can progress to diabetes within the next five years or by 2028. Thus, the situation is alarming & can be aptly termed as a 'diabetes epidemic'. To make things simple to understand, we can say that diabetes affects approximately one in every 11 adults globally. [4]

A retrospective cohort of youth with T1D with 11 years of data (2002-2012) on incidence trends of DKA in children & adolescents with t1D in British Columbia, Canada. From among the 2615 incident cases of Type 1 diabetes, 32.4% presented in DKA. Rates of DKA at diagnosis remained stable over 11 years with a range of 24.1 to 37.3 per 100-person years. [16]

Similarly, in the study, rates of DKA in youth with diagnosed T1D were stable with a range of 4.9 to 7.7 per 100-person years. DKA risk was higher at diagnosis for those aged less than 5 years & DKA risk after diagnosis was higher in females & those with age more than 10 years. Hence, it tells us that DKA continues to be too frequent in children & adolescents with T1D & is an unnecessary cause of morbidity & mortality. [16]

DKA may be the initial presentation in approximately 25-40% of patients with Type 1 diabetes. It may lso occur in at least 34% patients with Type 2 diabetes. DKA has economic as well as medical implications. [9]

CLINICAL FEATURES

In DKA, D stands for diabetes mellitus with increased blood glucose. K stands for ketoacidosis in blood & urine. The second letter A stands for a high anion gap in metabolic acidosis. It is the most common acute hyperglycemia emergency in people with diabetes mellitus. [8]

The most common early symptoms of DKA are the insidious increase in polydipsia and polyuria. The following are other signs and symptoms of DKA. These are malaise, generalized weakness, and fatigability. Nausea and vomiting may be associated with diffuse abdominal pain, decreased appetite, and anorexia. Rapid weight loss in patients newly diagnosed with type 1 diabetes. [10]

History of failure to comply with insulin therapy or missed insulin injections are other reasons. Others are due to vomiting or psychological reasons or history of mechanical failure of insulin infusion pump. The other symptoms are decreased perspiration, altered consciousness e.g. mild disorientation, confusion, frank coma is uncommon but may occur when the condition is neglected or with severe dehydration/acidosis. [10]

Signs and symptoms of DKA associated with possible intercurrent infection are fever, coughing, chills, chest pain, dyspnea & arthralgia. In addition, there are some general findings on DKA.

On examination, general findings of DKA include the following lists of appearance. These are dry skin, labored respiration, dry mucous membranes, decreased skin turgor, decreased reflexes, characteristic acetone (ketotic) breath odor, hypotension, tachypnea & tachycardia. [10]

In addition, evaluation of DKA patients should be done for signs of possible intercurrent illnesses such as Myocardial Infarctions (MI), Urinary Tract Infections

(UTI), pneumonia, and perinephric abscess. Search for signs of infection is mandatory in all DKA cases. [10]

MOVING AHEAD

In order to manage & diagnose diabetes, managing DKA & other related complications, the relation between glucose, serum, blood levels, glycosuria & ketones has to be understood. As mentioned above, the presence of glucose in the urine although often associated with diabetes may not be diabetes also. Only a thorough evaluation helps to differentiate various underlying causes. In addition, recognizing the consequences of ketone build up & metabolic acidosis is extremely critical for early intervention & appropriate medical care in diabetic individuals.[1,2,5,19,20]

Diabetic ketoacidosis (DKA) is the most common hyperglycemic emergency and causes the greatest risk for death that could be prevented in patients with diabetes mellitus. DKA occurs more commonly among patients with type-1 diabetes with a thirty percent of the cases take place in patients with type 2 diabetes. DKA is characterized by sever hyperglycemia, metabolic acidosis and ketosis. Proper management of DKA requires hospitalization for aggressive replacement and monitoring of fluids, electrolytes and insulin therapy. [11]

Moreover, with increasing healthcare costs and a changing healthcare system, prevention of diabetic ketoacidosis remains essential. Though management of diabetic ketoacidosis has followed a set algorithm for many years, there are exciting management alternatives on the horizon such as subcutaneous insulin administration for uncomplicated DKA patients. By understanding DKA, including its pathogenesis, presentation, treatment, and prevention, admissions may be decreased and length of stay shortened. [12]

Diabetic Keto Acidosis (DKA) is still a major contributor to morbidity and mortality in diabetes. The triad of hyperglycaemia, ketosis and acidosis can be diagnosed within a few minutes of the patient presenting, by measuring blood glucose and ketones using a meter, and venous blood pH on a blood gas analyser. Quantifying ketosis allows accurate distinction between simple hyperglycaemia and metabolic decompensation. [14]

Health system capacity to manage DKA was low across the nine Low Income & Lower Middle-Income Countries (LLMICS) chosen for a study. Although efforts are underway to strengthen health systems, a specific focus on DKA management is still needed. [13]

HOMOEOPATHIC APPROACH

There are primarily two types of diabetes, one is diabetes mellitus & the other is diabetes insipidus. Here, both are discussed. The third is not discussed as it affects the brain only. [23]

The main reference book that the article considers is the ‘Concise Repertory of Homoeopathic Medicines by Dr. Shankar Raghunath Phatak (1896-1981), M.B.B.S. who practiced Homoeopathy in Pune, Maharashtra. He did his Medical Graduation from Grant Medical College, Mumbai. [23]

The lead author has picked up the drugs that are mentioned in capital letters under diabetes in the above-mentioned book. These are the drugs that act in high sugar levels thereby preventing DKA. This condition leads to various metabolic related issues. The drugs are Bovista, Helonias, Phosphorus, Phosphoric Acid, Tarentula, Terebinth & Uranium Nitricum. [23]

As mentioned above, the symptoms of DKA are malaise, generalized weakness, and fatigability. Nausea and vomiting may be associated with diffuse abdominal pain, decreased appetite, and anorexia. There is also rapid weight loss in patients newly diagnosed with type 1 diabetes.

Let us see the medicines as per the symptoms. For malaise, ‘Natrum Ars’, ‘Sarcolactic Acid’ in potencies & ‘Avena Sativa’ in Mother Tincture can be prescribed. [21-25]

For Generalized Weakness & Fatigability, ‘Medicago Sativa’, ‘Sterculia’ Mother Tinctures can be prescribed. [21-25]

For Nausea & Vomiting, ‘Morphinum Aceticum’ can be prescribed in potencies. [21-25]

For diffuse abdominal pain. ‘Nepetaria Cataria’ & ‘Plumbum Iod’ can be prescribed in potencies along with appropriate Bio-chemics. [21-25,29]

For decreased appetite, ‘Gentiana Lutea’ can be prescribed in potencies & Mother Tinctures also. [21-25]

For Anorexia, ‘Acid Mur’ can be prescribed in potencies & Mother Tinctures. [21-25]

For rapid weight loss, 'Tuberculinum' & 'Hydrastis' in potencies can be prescribed along with 'Myrica Cerifera' in Mother Tinctures. [21-25]

These medicines are to be given along with the medicines for diabetes as mentioned above.

Besides the potency medicines, the mother tinctures of Indian drugs can also be prescribed. DKA is the leading cause of metabolic issues here & because of metabolic issues, the organs get weakened & complications occur. Hence, the medicines that cover both diabetes & DKA issues are to be prescribed. Under these two conditions, Indian drugs like "Cephalandra Indica', 'Abroma Augusta', 'Gymnema Sylvestre', 'Syzyzium Jam' & 'Terminalia Batterica' can be prescribed in mother tinctures. [24,25]

The potency medicines mentioned in Allen & Phatak for odour issues in urine are 'Acid Benz', 'Cantharis', 'Coloccynth', 'Natrum Mur', 'Nitric Acid', 'Oleum Animale', Secale Cor' & 'Urtica Urens'. [23]

Besides, the specific drugs for Diabetes Mellitus like Arsenic Bromide, Alloxan, Phaseolus, Phlorizin can also be prescribed. [21,22]

In cases of Diabetes Insipidus, drugs like 'Abroma Augusta', 'Acid Phos' & the Biochemic medicine 'Five Phos' can be prescribed. [21,22,23,]

For prevention of uncontrolled sugar levels & DKA, Miasmatic prescribing should be done by the homoeopath based on the predominant Miasm in each case. [28]

It is also equally critical to keep the Bach flower remedy known as 'Rescue Remedy' as these patients can be saved from DKA complications as well. The homoeopath can prescribe a single or a combination of the remedies from among all the 38 Bach Flower remedies that are prescribed for complications of the systems of the body & particularly the nervous system. [30]

The preventive & curative medicines like the Bowel Nosode 'Bacillus Number 7' can be prescribed for mental & physical fatigue. As DKA is related to nutrition issues, the bowel nosode "Gartner Bach' can be prescribed. Besides these the homoeopath should choose the appropriate Bowel Nosode after selecting the 'Polychrest' based on the 'Generalities' of each case. [18,27]

As the entire process is of inflammation inside the body, anti-inflammatory medicines like 'Prednisone', 'Cortisone', 'Hydrocortisone'. 'Curcuma Longa' in potencies has to be prescribed. Besides the Morgan group of bowels nosodes can be prescribed as these are anti congestive. [21,22,23,27]

Another specific medicine is 'Chromium' in potencies. This drug is prescribed in issues related to diabetes. [2,21,22]

As per Murphy's Materia Medica, there is one drug mentioned in capitals under diabetes insipidus in the medical repertory guide section of the book. The drug is 'Equisetum' that is to be given in potencies as well as in mother tinctures. [21,22]

Similarly, under diabetes mellitus, the drugs mentioned in capitals are 'Alloxan', 'Bovista', 'Carcinosin', 'Helonias', 'Lycopodium', 'Phosphoric Acid', 'Phosphorus', 'Plumbum'. 'Syzyzium', 'Tarentula', 'Terebinth', 'Uranium Nitricum'. These drugs are to be given in potencies & as well as mother tinctures. [21,22]

BURDEN OF DISEASE

TABLE 1- Prevalence of Blood Sugar Among Adults in India [17]

Indicator	Gender	Urban	Rural	Total
Percentage of Women age 15 years and above who have high blood sugar level (141-160mg/dl)	Female	6.7	5.9	6.1
Percentage of Women age 15 years and above who have very high blood sugar level (>160mg/dl)	Female	8.0	5.5	6.3
Percentage of Women age 15 years and above who have high or very high blood sugar level(>140mg/dl) or taking medicine to control blood sugar level	Female	16.3	12.3	13.5

Percentage of Men age 15 years and above who have high blood sugar level (141-160mg/dl)	Male	7.8	7.0	7.3
Percentage of Men age 15 years and above who have very high blood sugar level (>160mg/dl)	Male	8.5	6.5	7.2
Percentage of Men age 15 years and above who have high or very high blood sugar level(>140mg/dl) or taking medicine to control blood sugar level	Male	17.9	14.5	15.6

This reflects the magnitude of the problem in the country from the perspective of NCDs as diabetes is a metabolic disorder with an altered biochemistry in the body. The data show that males are more diabetic than females in India. [17]

Currently, the Crude Death Rate includes Non-Communicable Diseases (NCD) deaths and this trend is catching up as NCDs have the upper hand than the Communicable Diseases (CD) as a result of epidemiological transition. Diabetes is one such NCD with an improper CNS/brain in affected people. [17,36]

In India, Homoeopathy is the third preferred system of treatment after Allopathy and Ayurveda. About 10% of the populations depend on Homoeopathy for their health issues.

Homoeopathy is used by 10% of the population in India. So, out of the 1300 million populations, 130 million use Homoeopathy or 130 million use Homoeopathy for their health issues. These 130 million consist of all age groups i.e. infant to old age. [34,35]

A section among the 15+ age group suffers from diabetes as per NFHS 5. Considering that, it is 2/3rd of the population in India (15-65+ year age group) or 100 crore or 1000 million. Out of these 100 crores, 27% adults are diabetic or about 27 crores are diabetic. These people are at risk from the rest 73 crores. As 130 million use homoeopathy, 2/3rd of the users will be in 15-65+ year age group or 98 million. So, if homoeopathy in integrated in to the diabetic battle in India, 98 million people can be saved from being complicated diabetic cases or DKA cases. Application of these concepts in homoeopathy will reduce DKA issues due to diabetes & this step will be a boon for the nation. [34,35]

COVID 19 & DIABETIC KETO ACIDOSISA study on case series shows that COVID-19 infection can precipitate DKA in patients with known diabetes mellitus patients or as a first manifestation in undiagnosed DM patients. COVID-19 with DKA is associated with substantial mortality. The study suggests that further studies are needed to characterize poor risk factors associated with mortality in these patients. [15]

In the said study, the median age of the patient was 42.5 years, and seven were males and one was female. Out of eight patients, five had type 2 diabetes mellitus (DM), two had undiagnosed DM, and one had type 1 DM. Median value of initial glucose on presentation was 454 mg/dL. Median value of HbA1c on presentation was 11.4% and of anion gap was 26.5 mEq/L. Four patients had large ketonemia, one patient had moderate ketonemia, and three patients had small ketonemia. All the patients were started on standard treatment protocol for DKA with intravenous fluids and IV insulin infusion. Acute kidney injury (AKI) was seen in four patients, and one patient required renal replacement therapy. Out of eight patients, three required mechanical ventilation, and the same three patients died. [15]

CONCLUSION

As all drugs in homoeopathy have a group of mental as well as physical symptoms, Homoeopathy is and will be effective against all DKA cases in general as it takes care of not only the mental/psychological issues but also the internal inflammation as well. However, it should be also seen that along with constitutional/deep acting/polychrest Homoeopathic medicines, specific medicines that cover all aspects & complications of DKA are also required to deal with the cases. [21-30]

It should be ensured that nutrition, counseling, physical activity and all psychic health modalities like life style modification, diet and stress reduction are adhered in each case. In fact, the detailed Materia Medica of Homoeopathy has drugs for each of the phenomenon or complications that occur in the body during the hyperglycemia stage. Hence, as a part of treatment for diabetes, the supportive therapy like reading, socializing,

mobilizing activities are to be prioritized in each case for optimal metabolic health. [2,19,20,21-30]

To get optimal results, the Homoeopathic fraternity should be ready to cover the diabetic cohort among masses as there is no other therapeutic system that can cover the masses effectively both therapeutically & economically. Homoeopathy can play an active role currently as the diabetic situation is already complicated by the Long COVID 19 issues in the community since the last 4 years. [15,31,32,33]

DECLARATION OF THE LEAD AUTHOR

Prof. Shankar Das, a co-author of the current article was the Ph.D. guide of the lead author at Tata Institute of Social Sciences, Mumbai. Prof. D.P. Singh was the teacher of the lead author at TISS, Mumbai during 1995-1997. The lead author also certifies that he has expressed his personal opinion based upon his public health and clinical experiences. The treatment approach or the medicines suggested are only suggestive in nature.

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