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TO STUDY TRENDS OF VARIOUS PRESENTATION, SEASONAL VARIATION AND PRECIPITATING FACTORS OF DIABETIC KETOACIDOSIS (DKA)

Medicine

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ABSTRACT

Introduction: Diabetic ketoacidosis is one of the most common complications of uncontrolled diabetes and is the result of 16% diabetes related fatalities. Diabetes mellitus is a metabolic disorder characterized by chronic hypoglycemia and disturbances in carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action. Diabetes mellitus is generally classified into Type 1 and Type 2 diabetes. Type 1 DM is a complete or near complete insulin deficient states due to autoimmune destruction of pancreatic beta cell. Type 2 DM is mostly due to insulin resistance rather than complete insulin deficiency. Here ,insulin resistance plays a major role. **Aims:** To study various risk factors and seasonal variations of DKA as well as evaluate the common presentation of DKA. **Methodology:** This is a hospital based prospective observational study conducted on 290 patients presenting in medicine casualty and admitted in GMCH Aurangabad with history of DKA between January 2019 to December 2020. **Results:** Majority of the patients with DKA were admitted in autumn season. **Conclusion:** Knowledge of the clinical profile and risk factors precipitating DKA, will aid in diagnosing cases of DKA and its appropriate management.

KEYWORDS

Diabetic Ketoacidosis, Diabetes,

INTRODUCTION

Diabetes mellitus (DM) is a metabolic illness with many different aetiologies that is defined by persistent hyperglycemia and changes in the metabolism of carbohydrates, fats, and proteins as a result of problems with insulin secretion, insulin action, or both. Diabetes is often divided into Type 1 and Type 2 varieties. Due to the autoimmune death of pancreatic beta cells, type 1 diabetes is characterised by a total or almost complete lack of insulin. Instead of total insulin insufficiency, insulin resistance is the primary cause of type 2 diabetes.[1]The World Health Organization (WHO) reports that, among adults aged 20 to 64, the number of people with diabetes climbed from 177 million in 2010 to 326.5 million in 2017. By the year 2040, it's predicted that there will be about 438 million people on the planet. With about 72 million cases of diabetes in 2017, India accounts for 49% of the global burden. According to the data, 134 million people are anticipated to be living in the world by 2025.[2]

According to the multi-centric study, diabetes was prevalent in India in the 1970s at 2.3% in urban areas and 1.5% in rural regions. In recent years, the prevalence has increased to 12% to 19% in urban areas and from 4% to 9% in rural areas. 3 A few population-based studies conducted in India estimate that between 18 and 27% of people there have retinopathy, 2.2% to 2.2% have overt nephropathy, 6.3% have peripheral vascular disease, 26% have peripheral neuropathy, and 21% have coronary artery disease.[3]

The two severe ends of the spectrum of an uncontrolled diabetic state—diabetic ketoacidoss (DKA) and hyperosmolar hyperglycemia—represent the dangerous signs of diabetes mellitus (DM). In India, DKA is the cause of 16% of all diabetes-related fatalities and 14% of all hospital admissions among diabetics. DKA primarily affects people with type 1 diabetes. Insulin insufficiency is the primary flaw in the aetiology of DKA. The hormone glucagon is a counter-regulatory hormone that promotes gluconeogenesis and causes hyperglycemia. Ketosis results from the creation of ketone bodies such acetoacetate and beta hydroxyl butyrate from hepatocytes as a result of absolute insulin shortage and hyperglycemia.

According to Joint British Diabetes society guidelines, [4] DKA is defined as

1. Ketonaemia 3 ml mol / l and over or significant ketonuria &UK>than 2+ on standard urine dip sticks.
2. Blood glucose over 200mg/dl or known diabetes mellitus.
3. Venous bicarbonate below 15 meq/l
4. Arterial or Venous pH < 7.3

Respiratory tract infections, genitourinary tract infections, omission of insulin or oral antidiabetic medications, suboptimal insulin dose, and cerebrovascular accidents including ischemic and hemorrhagic stroke are the triggering factors for the pathogenesis of DKA. Individuals with DKA will exhibit polyuria, thirst, weight loss, generalised fatigue, nausea, vomiting, blurred vision, and abdominal pain as symptoms. Dehydration, hypotension, peripheral cyanosis, tachycardia, air hunger (Kussmaul breathing), acetone odour, hypothermia, confusion, drowsiness, and coma are possible symptoms of the patient.

When DKA is appropriately managed, the majority of patients recover. If DKA is not managed, however, problems such cerebral edema, thromboembolism, acute respiratory distress syndrome (ARDS), disseminated intravascular coagulation (DIC), abnormal electrolytes, myocardial infarction, infections, and acute circulatory failure may occur. Early diagnosis of ketoacidosis and prompt administration of insulin, intravenous fluids, and replacement of electrolytes may alter the course of the condition.

In people with diabetes mellitus, there is a considerable seasonal change in the probability of hospital admission for DKA and hypoglycemia. The environmental elements linked to these difficulties are seldom understood, though. This study's goal was to look for seasonal fluctuations in DKA admissions.[5]

AIMS AND OBJECTIVES

1. To study various risk factors and seasonal variations of DKA.
2. To evaluate the common presentation of DKA

METHODOLOGY

The current study is a hospital based prospective observational study conducted on 290 patients presenting in medicine casualty and admitted in GMCH Aurangabad with history of DKA between January 2019 to December 2020.

Inclusion Criteria :

1. Patients of DKA above age of 12 years were taken for study.
2. All DKA patients admitted in tertiary care hospital irrespective of type of Diabetes except GDM.
3. Patients or the relatives who have given informed written consent.

Exclusion Criteria :

1. Gestational diabetes mellitus
2. Hyperosmolar Hyperglycemic states

3. Non Ketotic coma
4. Patients /relative who have not given informed written consent.

Detail Procedure of study:

For the admission, to the protocol, patient had following criteria: Hyperglycemia >200mg /dl, urine positive for ketones, serum bicarbonate level <15mEq/L, and / or acidosis with blood PH <7.3. A well written valid informed consent was taken from all the participants. On admission a detailed case history was recorded and a thorough clinical examination was conducted. Relevant investigations were carried out at the time of admission. Some of the examinations conducted included complete blood count, blood sugar level, serum electrolytes, arterial blood gases, urine sugar level, urine ketones, urine microscopy. Radiological investigations such as X-Ray chest were also carried out.

Withdrawal / Discontinuation criteria:

1. Patients who refused to participate in the study was excluded.
2. Patient not giving written consent was excluded from the study.

Statistical Analysis

Data was collected and analyzed using one tailed Students T test (paired or unpaired as appropriate) for continuous variables & Chi Square test for categorical data. Data analysis was done by appropriate statistical method with statistical software SPSS Ver. 20. (Statistical Package for the social Sciences)

RESULTS

Table 1: Distribution of patients according to Age

Sr. No.	Patients Age	No. of DKA Patients	Percentage
1.	13- 20	39	13.6%
2.	21-30	58	20.2%
3.	31-40	61	21.3%
4.	41-50	52	18.1%
5.	51-60	32	11.1%
6.	61-70	34	11.8%
7.	71-80	10	3.4%

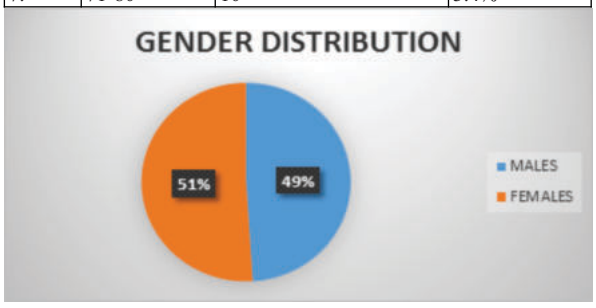

Figure 1 : Distribution of patients according to Sex

Table 2 : Distribution of patients according to age of onset duration of diabetes and incidence of DKA

Sr.No.	Duration of diabetes in years	No of DKA patient	Percentage
1.	0-5	189	65%
2.	6-10	69	23%
3.	11-15	23	8%
4.	16-20	9	3%

Table 3 : Clinical profile of DKA patients various presentation of DKA

Sr.No.	Presentation	No of DKA patient	Percentage
1.	Nausea/Vomiting	157	54%
2.	Fever	122	42%
3.	Thirst/Polyurea	20	7%
4.	Abdomen Pain/Loose Motion	116	40%
5.	Shortness Of Breath	116	40%
6.	Mental Confusion	49	17%
7.	No Symptoms	0	

Table 4 : Seasonal trend of DKA after clubbing seasons together

Season	Season	No. of patients	Percentage
Jan-Feb	Early Spring	47	16.20%
March-April	Spring	48	16.55%
May-June	High Summer	45	15.51%
July-August	Late Summer	48	16.55%
Sept-Oct	Autumn	57	19.65%
Nov-Dec	Hibernal	45	15.51%

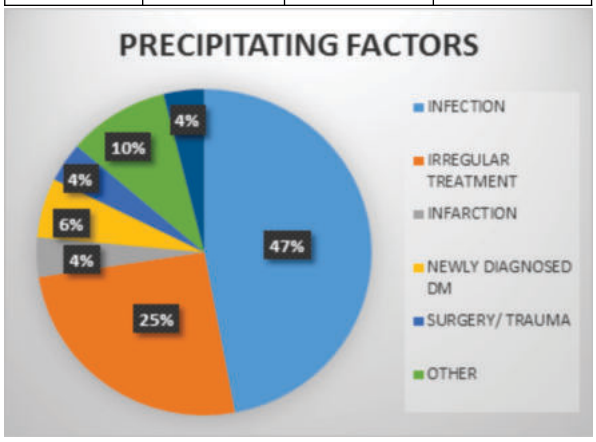

Figure 2: Precipitating factors

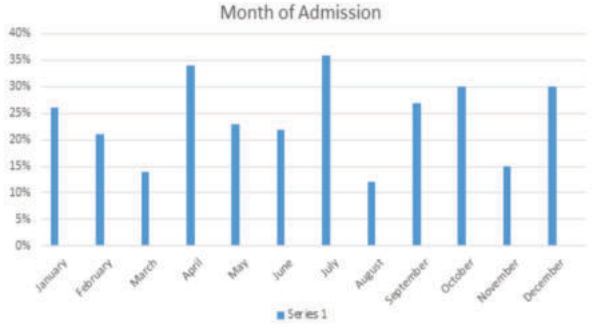

Figure 3: Month Of Admission

DISCUSSION

In the present study, minimum age observed was 13 years and maximum age observed was 80 years with a mean of 40.3 ± 16.89 years. This finding was consistent with a study a conducted by **Sue Fu Lin** [6] and **Balasubramanyam A et al** [7]. who observed a mean age of 43.1 ± 14.9 years and 35.5 ±10.1 years in their respective studies. According to study by **Gaikwad V** [8],the mean age of the patients in their study was 25.17±8.74 years. Studies by **Matto VK** [9] reported a mean age of 21 ± 4.2 years. The American Diabetes Association stated in a consensus statement[10] that the core pathophysiology and presentation of this potentially fatal complication are the same in children and adults, therefore the age group does not matter.

A slight female predominance (51%) has been noted in the current study. The male: female ratio was almost 1:1. Similar results were obtained by **Matto VK**[9] and **Sue Fu Lin**[6]. Contrasting results were obtained by **Gaikwad V et al** [8] who observed 42.67% females and 57.35% males in their study. The variation in the sex ratio between the study groups, however, is likely complex and influenced by changes in the social, genetic, and environmental contexts.

In the present study, the incidence of DKA was more in early period of diabetes with a mean of 56.33 ± 53.74 months. 65% cases were present within 5 years of onset of diabetes. In one study the duration of diabetes varied in the following manner: 2.2% presented with DKA within a year and 2.8%, 2.9% and 4.3% presented within 1- 5 years, 6-10 years and >10 years respectively.[11]

In present study, most common symptoms at the time of admission were nausea /vomiting (54%) and fever (42%). These results were in line with those of a study conducted by **Rajasoorya et al**[12]. In one investigation, the following clinical symptoms were present: stomach discomfort (51%), polyuria (75.2%), polydipsia (74.4%), polyphagia (33%) and nausea (83.4%). [13]

According to Sharon[14] several clinical symptoms of DKA are present. One such symptom was altered sensorium, which occurred in 20% of study participants and was the second-most prevalent symptom after vomiting, which was observed in 26% of study participants.

In this study, most common risk factor for DKA was found to be infections in (46%). Amongst infections, respiratory tract infections were more common followed by urinary tract infections. These results were comparable with results of a study done by **Matoo VK**[9]. According to **Gaikwad V et al** [8], the most common risk factor for DKA was infection followed by omission of treatment or irregular treatment. According to **Sue Fu Lin**[6], infection was seen in 31.7% cases followed by non-compliance in 27.7% cases.

In the present study the incidence of DKA was highest in autumn (19.65%) followed by autumn (16.55%) and late summer (16.55%). There was no significant seasonal variation in incidence of DKA. According to descriptive study by **Gaikwad V et al** [8], cases of DKA were more common in spring and summer especially high summer. In two previous studies [15,16] done in other countries, incidence of DKA was higher in winter but the finding was statistically insignificant.

Limitations

The current study is not without limitations**.** In this study, urine acetone was used as a diagnostic method to detect ketoacidosis. Plasma ketone estimation was not done. A small sample size was a major drawback. Follow-up of DKA patients was not done post the study period.

CONCLUSION

Knowledge of the clinical profile and risk factors precipitating DKA, will help to diagnose cases of DKA, and manage properly. It will also help in counselling of patients about importance of adherence to treatment and prevention or early detection and treatment of infection to prevent occurrence of DKA.

REFERENCES

1. Text book of internal medicine- Harrison's- 20th edition
2. Kulkarni S, Kondalkar S, Mactaggart I, et al. Estimating the magnitude of diabetes mellitus and diabetic retinopathy in an older age urban population in Pune, western India. BMJ Open Ophthalmology 2019;4:e000201. doi:10.1136/bmjophth-2018-01
3. API text book of medicine – 11th edition
4. Joint British Society Guidelines for DKA ,m.w .savage .,11 jan 2011
5. Sonia Butalia, Jeffrey A. Johnson, William A. Ghali, Doreen M. Rabi (2011), Seasonal Variation of Hospital Admissions for Diabetic Ketoacidosis and Hypoglycemia in Adults with Type 1 Diabetes (2011) 1375-P.
6. Sue Fu Lin,, Jen Der Lin Yao Huang, Diabetic ketoacidosis: Comparisons of patient charActeristics, clinical Presentation and outcomes Today and 20 years ago, Journal Chang Gung Med J, 2005 28(1);24-30 (ISSN 2072-0939).
7. Balasubramanyam A- New profile of diabetic ketoacidosis: Type 1 vs Type2 diabetes and the ethnicity; Archives of internal medicine 1999,vol 159
8. Gaikwad V, Deshmukh JK, Deshmukh P, Takalkar AA. Clinical features and risk factors for diabetic ketoacidosis in type 1 diabetes mellitus at tertiary care centre, Maharashtra, India. Int J Adv Med 2020;7:745-9.
9. Matoo V. , Nalini K, Dash R., Clinical Profile and Treatment Out Come of DKA J.A.P.I. 1991 May 39(5) 379-381
10. American Diabetes Association, standards of medical care in diabetes- 2019 January 2019 Volume 42, Supplement 1.
11. Patel JC, Dhirawani MK, Kapekar SG. Analysis of 5481 subjects of diabetes mellitus. Diabetes in Tropics; 94- 99.
12. C Rajasoorya- diabetic ketoacidosis- a study of 33 episodes; Singapore med j 1993; vol 34: 381-384
13. Jean Louis Chaisson, Nahla AJ, Raphael B, Sylvie B, et al. Diagnosis and treatment of diabetic ketoacidosis and hyperglycemic hyperosmolar state. CMAJ 2003; 168(7):859-66.
14. Dr. Sharon. S (2018), A Study of Predictors and Factors Affecting Outcome In Diabetic Ketoacidosis Patients, M.D. Degree Examinations, General Medicine.
15. Neu A. Willasch A, Ehehalt S, Hub R, Ranke MB, DIARY group, Ketoacidosis at onset of type 1 diabetes mellitus in children frequency and clinical presentation. Pediatr Diabetes 2003, June ,4(2) 77-81.
16. Olak-Bialon B,Deja G,Jarosz-Chobot P,Buczkowska E, The occurance and analysis of chosen risk factors of DKA among children withnew onset of type 1 DM.Pediatr Endocrinol Diabetes Metab 2007;13:85-90.