



DIABETIC KETOACIDOSIS - A PROSPECTIVE STUDY OF RISK FACTORS AND CLINICAL PROFILES IN A TERTIARY CARE HOSPITAL

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ABSTRACT **INTRODUCTION:** Diabetic ketoacidosis (DKA) is a life-threatening condition caused by a decrease in effective circulatory insulin along with an increase in counter – regulatory hormones leading to hyperglycemia, hyperosmolarity, increased lipolysis, ketonemia, and metabolic acidosis. It is characterized by absolute or relative insulin deficiency with overall mortality rate of up to 5 % in healthcare centers. **Background and objectives:** A prospective study to identify risk factors and clinical profiles in a diabetic ketoacidosis (DKA) in a tertiary care hospital. **Materials and Methods:** 50 patients with diabetic ketoacidosis meeting the inclusion criteria for diabetic ketoacidosis are included in the study. Diagnosis of diabetic ketoacidosis was made according to the inclusion criteria. Hyperglycemia >250 mg/dl, acidosis with blood pH <7.3, urine positive for ketones. **Results:** 50 patients were included in the study. Out of a total of 50 patients, 21 (42%) of patients had type I and 29 (58%) of patients had type II diabetes. Among the 50 patients, 23 (46%) of patients were males and 27 (54%) of patients were females. Majority of the patients 12 (24%) were in the age group of about 30-40 years and 50-60 years of age. Most of the patients 34 (68%) had nausea and vomiting as chief presenting symptoms. 33 (66%) had shortness of breath, 24 (48%) had the fever, 23 (46%) had abdominal pain, and 5 had Altered sensorium (10%). The most common precipitating factor was Drug incompliance 16 (32%) and followed by Urinary tract infections 12 (24%), pancreatitis 3 (6%), Gastroenteritis 3 (6%), Acute febrile illness 2 (4%), sepsis 2 (4%), Diabetic foot ulcer 1 (2%), starvation 1 (2%). Random blood sugar levels are more than 300 mg/dL in 48 (96%) of patients in majority of patients at time of presentation.

KEYWORDS : Clinical And Biochemical Profile; Diabetic Ketoacidosis; Precipitating Factors.

AIM AND OBJECTIVES

A prospective study to identify risk factors and clinical profiles in a diabetic ketoacidosis (DKA) in a tertiary care hospital.

MATERIALS AND METHODS

PLACE OF STUDY:

50 Inpatients in Acute medical care unit of Government General Hospital, Kurnool.

PERIOD OF STUDY:

The study period was Six months i.e., from August 2019 to January 2020.

STUDY DESIGN:

A Prospective cross-sectional study.

INCLUSION CRITERIA:

- Patients above 18 years of age
- The patient should be previously diagnosed as diabetic or a newly diagnosed diabetic and are on treatment .

Biochemical Inclusion criteria

- Blood glucose levels > 250 mg/dl .
- Urine sample - Positive for ketone bodies .
- PH values <7.3

EXCLUSION CRITERIA:

- Patients below 18 years of age are excluded.
- Diabetic Ketoacidosis (DKA) cases with co morbidities are excluded from the study.

METHOD OF STUDY:

The study begins with the selection of the patients based on the inclusion criteria followed by the collection of all the baseline parameters of the patients demographic details, medical history, past allergies, personal history, family history, laboratory data and present treatment and all the data of the data of the subjects are collected by using the patient proforma.

RESULTS

AGE DISTRIBUTION:

A total of 50 patients were analyzed for a period of 6 months. Among 50 patients Diabetic Ketoacidosis (DKA) was more common among the age group of 30-40 and 50-60 years of age. The average age was found to be 36.98 (SD±16.48) years.

Table – 1: Age Distribution of DKA Patients (n = 50)

S.NO	AGE	No. of Patients	Percentage (%)
1	10 - 20	11	22
2	21 - 30	7	14
3	31 - 40	12	24
4	41 - 50	6	12
5	51 - 60	12	24
6	61 - 70	2	4
Mean ± SD			36.98 ± 16.48

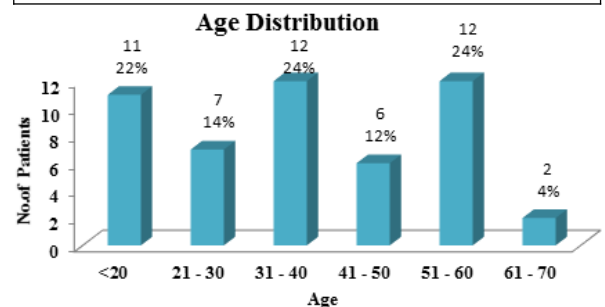


Figure – 1: Age Distribution of DKA Patients (n = 50).

GENDER DISTRIBUTION:

Among 50 Patients the gender distribution is as follows i.e., Females are 27(54%) and males are 23(46%).

Table – 2: Gender Distribution (n = 50)

S.NO	Gender	No. of Patients	Percentage (%)
1	Male	23	46
2	Female	27	54

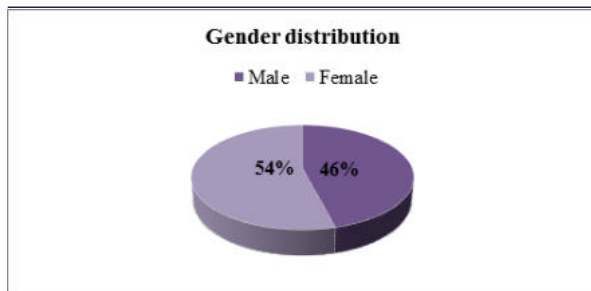


Figure – 2: Gender Distribution (n = 50)

DISTRIBUTION OF DIABETIC POPULATION:

Among 50 Patients, 21 (42%) were type – I and 29 (58%) were types – II patients.

Table – 3: Distribution of Diabetic population (n = 50)

S.NO	Type of Diabetes	No. of Patients	Percentage (%)
1	Type - I	21	42
2	Type - II	29	58

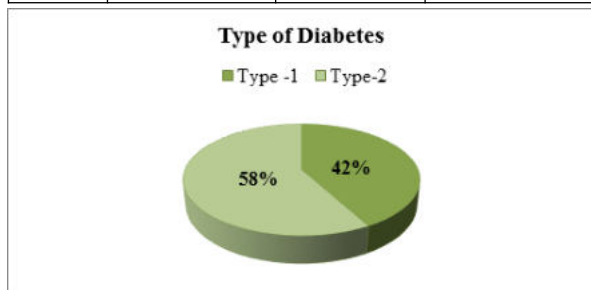


Figure – 3: Diabetic Population: (n = 50)

PRECIPITATING FACTORS IN DKA PATIENTS:

Among 50 patients, the most common precipitating factor was Drug incompliance 16(32%) and followed by Urinary tract infections 12(24%), pancreatitis 3 (6%), Gastroenteritis 3(6%), Acute febrile illness 2(4%), sepsis 2(4%), Diabetic foot ulcer 1(2%), starvation 1(2%). Among 50 patients first presentations of DKA were 13 (26%) and unknown causes for Diabetic Ketoacidosis (DKA) were 8(16%).

Table – 4: Precipitating Factors (n = 50)

S.NO	Precipitating Factors	No. of Cases	Percentage (%)
1	Drug Incompliance	16	32
2	Urinary Tract Infections	12	24
3	Sepsis	2	4
4	Diabetic Foot Ulcer	1	2
5	Gastroenteritis	3	6
6	Acute Febrile illness	2	4
7	Pancreatitis	3	6
8	Starvation	1	2
9	First Presentation	13	26
10	Unknown	8	16

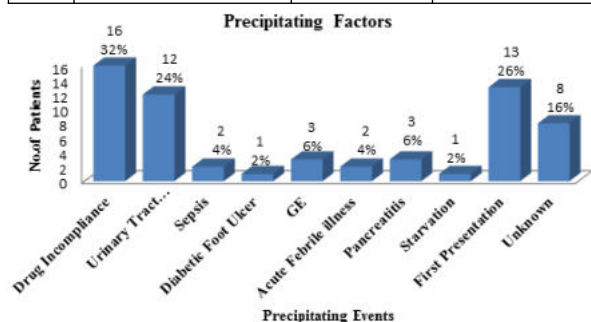


Figure – 4: Precipitating Factors: (n = 50)

CLINICAL MANIFESTATIONS:

Among the 50 patients, 34(68%) had nausea and vomiting as chief presenting symptoms. 33(66%) had Shortness of breath, 24(48%) had the fever, 23(46%) had abdominal pain, and 5 had Altered sensorium

(10%).

Table – 5: Clinical Manifestations (n = 50)

S.NO	Clinical Manifestations	No. of. Cases	Percentage (%)
1	Nausea/Vomiting	34	68
2	Abdominal Pain	23	46
3	Shortness of Breath	33	66
4	Fever	24	42
5	Altered Sensorium	5	10
6	Lethargy	36	72
7	Constitutional Symptoms	29	58

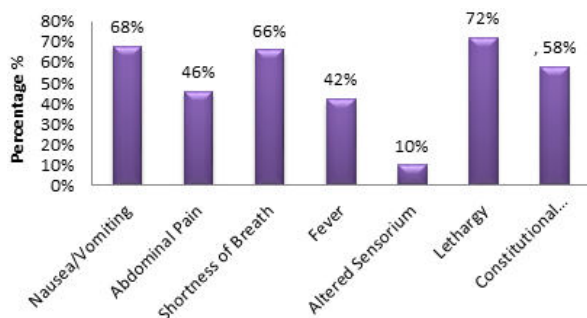


Figure – 5: Clinical Manifestations: (n = 50)

GLYCEMIC LEVELS:

Among the 50 patients 15 (30%) patients had Random blood sugar values of about 200-300mg/dL and 11(22%) of patients had 300-400mg/dL, 9(18%) of patients had 400-500mg/dL, 11(22%) had 500-600mg/dL and 2(4%) had 600-700 mg/dL of Random blood sugar. Average RBS value among 50 patients was found to be 383 mg/dL SD ± 130.6989.

Table – 6 Glycemic Levels (n = 50)

S.NO	Glycemic Range (mg/dL)	No. of Patients	Percentage (%)
1	200 – 300	15	30
2	300 – 400	11	22
3	400 – 500	9	18
4	500 – 600	11	22
5	600 – 700	2	4
Mean ± SD		383±130.6989	

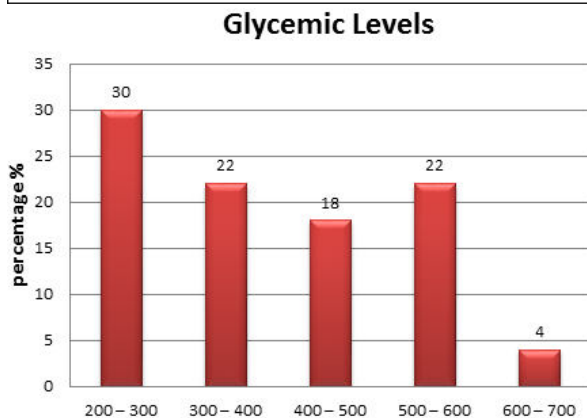


Figure – 6: Glycemic Levels: (n = 50)

KETONE INDEX IN DIABETIC KETOACIDOSIS (DKA) PATIENTS:

Among 50 patients 11(22%) of patients had Small, 17(34%) of patients had Moderate and 22(44%) of patients had Large levels of ketone bodies in urine.

Table – 7: Ketone Index (n = 50)

S.NO	Ketone Range	No. of Patients	Percentage (%)
1	Small	11	22
2	Moderate	17	34
3	Large	22	44

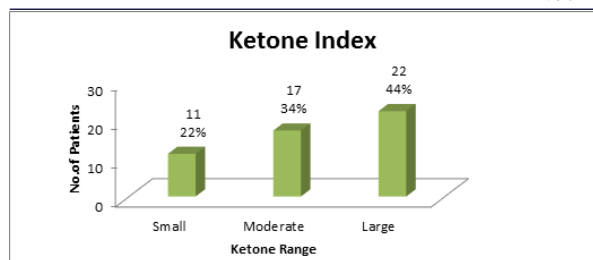


Figure – 7: Ketone Index: (n = 50)

DISCUSSION

Diabetic ketoacidosis (DKA) has been considered the hallmark of type I diabetes; but now, its presence has been increasingly recognized in patients with type II diabetes, when severe insulin resistance occurs with a coexisting illness like urinary tract infections, sepsis, gastroenteritis, pancreatitis.

DKA is caused by a decrease in effective circulatory insulin along with an increase in counter – regulatory hormones (glucagon, catecholamine, cortisol and growth hormone) leading to hyperglycemia, hyperosmolality, increased lipolysis, ketonemia, and metabolic acidosis. It is characterized by absolute or relative insulin deficiency with overall mortality rate of up to 5% in healthcare centers.

Diagnostic criteria for Diabetic Ketoacidosis

Variables	Mild	Moderate	Severe	HHS
Plasma glucose (mg/dl)	> 250	> 250	> 250	> 600
Arterial pH	7.25-7.3	7.24-7.1	< 7	> 7.3
Serum bicarbonate (mEq/L)	15-18	10-15	< 10	> 15
Urine ketones by nitroprusside method	Positive	Positive	Positive	Small
Serum ketones	Positive	Positive	Positive	Small
Effective serum osmolality (m Osm/kg)	Variable	Variable	Variable	> 320
Anion gap	> 10	> 12	> 12	Variable
Alteration in sensorium or mental obtundation	Alert	Alert / drowsy	Stupor / Cons	Stupor / cons

This study was conducted in the General medicine department of Govt. General Hospital, Kurnool over a period of 6 months i.e., from August 2019 to January 2020.

50 patients were included in the study. Out of a total of 50 patients, 21 (42%) of patients had type I and 29 (58%) of patients had type II diabetes.

Among the 50 patients, 23 (46%) of patients were males and 27 (54%) of patients were females.

One study has shown a higher incidence of diabetic ketoacidosis in women compared to men.

Majority of the patients 12 (24%) were in the age group of about 30-40 years and 50-60 years of age and 10-20 years of age group patients were 11 (22%) of patients, 20-30 age group patients were 7 (14%), 40-50 age group patients were 12 (24%), 60-70 age group patients were about 2 (4%). The average age was found to be 36.98 years.

Several other studies have reported that the average age of patients admitted for diabetic ketoacidosis was 40 to 50 years¹.

34 patients (68%) had nausea and vomiting as chief presenting symptoms. 33 (66%) had shortness of breath, 24 (48%) had the fever, 23 (46%) had abdominal pain, and 5 had Altered sensorium(10%).

Another study reported polyuria, polydipsia, abdominal pain and vomiting as the predominant clinical features³.

The most common precipitating factor was Drug incompliance 16 (32%) and followed by Urinary tract infections 12 (24%), pancreatitis 3 (6%), Gastroenteritis 3 (6%), Acute febrile illness 2 (4%), sepsis 2 (4%), Diabetic foot ulcer 1 (2%), starvation 1 (2%).

One study reported infection as the leading precipitating factor in 41%⁴.

Another study reported non- compliance with treatment (63.7%), infection (30.5%) and newly diagnosed (5.8%) as the cause^{5,6}.

Among 50 patients first presentations of Diabetic ketoacidosis (DKA) were 13 and unknown causes for Diabetic ketoacidosis (DKA) were 8 (16%). Average denovo diabetics among 50 patients were 6.5±4.94.

Random blood sugar levels are more than 300 mg/dL in 48 (96%) of patients in majority of patients at time of presentation. 15 (30%) patients had Random blood glucose levels values of about 200-300mg/dL and 11 (22%) of patients had 300-400mg/dL, 9 (18%) of patients had 400-500mg/dL, 11 (22%) had 500-600mg/dL and 2 (4%) had 600-700 mg/dL of Random blood glucose levels. Risk of mortality increased when the Random blood glucose levels values were more than 700 mg/dL at the time of presentation. Average RBS value among 50 patients was found to be 383 mg/dL.

22 (44%) of patients had developed a large range of ketone bodies in urine among 50 patients and 17 (34%) developed moderate range ketone bodies and 11 (22%) had a small range of ketone bodies.

CONCLUSION

From the above study, it is concluded that DKA was seen in both types I and type II diabetes. Among the study population female patients (54%) were high in number. Presentation of Diabetic ketoacidosis (DKA) was high among the type II diabetes (58%). DKA among adults was more common among patients in the age group of 30-40 (24%) and 50-60 (24%) years of age. Nausea/vomiting (68%), and shortness of breath (66%) were the most common presenting complaints. Most common precipitating factors include Drug Incompliance (32%) and Infection. Random blood sugar levels are 200- 300 mg/dL (30%) in the majority of patients at the time of presentation. So intensive patient education should be provided to avoid complications.

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