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Original Research Article

Acute metabolic complications of diabetes mellitus in a tertiary care center

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ABSTRACT

Background: Diabetes mellitus (DM) is a chronic medical disorder characterized by hyperglycemia. It arises due to inability of pancreas to produce insulin, either because of impaired insulin secretion, impaired action or both. Most of the untreated or inadequately treated patients develop acute metabolic complications. These complications are associated with high mortality and morbidity. Most common among the acute metabolic complications are diabetic ketoacidosis (DKA), hyperglycemic, hyperosmolar, non-ketotic state (HHNKS), Lactic acidosis (LA) and hypoglycemia. Early diagnosis and management of DM helps in preventing these complications. This study was aimed to determine the incidence of acute metabolic complications in DM and to determine the distribution of age and sex in different metabolic complications of diabetes mellitus.
Methods: A prospective study was conducted on all cases presenting to Emergency Medicine department for a period of one year from April 2014 to March 2015.
Results: Out of the 1211 cases 632 were Diabetic ketoacidosis, 329 cases were hypoglycemia, 201 cases were hyperglycemic hyperosmolar nonketotic state, 12 cases were lactic acidosis. The other 37 cases had findings which were overlapping with more than one type of acute metabolic complications related to diabetes mellitus. Two cases of HHNKS were associated with attacks of hypoglycemia. In this study, diabetic ketoacidosis was the common acute metabolic complication affecting Males aged less than 15 years.
Conclusions: Hypoglycemia is the commonest iatrogenic acute metabolic complications India diabetes mellitus. HHNKS affects patients aged more than 45 years. In some cases, there is considerable overlap of diabetic ketoacidosis, lactic acidosis, hypoglycemia and HHNKS.

Keywords: Acute metabolic complications, Diabetic ketoacidosis, DM, Hyperglycemic, hypoglycaemia, Hyperosmolar, Insulin, Lactic acidosis, Non-ketotic state

INTRODUCTION

Diabetes Mellitus is a chronic medical disorder characterized by hyperglycemia. It is a versatile disease in view of its clinical presentation and association with other diseases like hypertension and atherosclerosis.[1,2] It arises due to inability of pancreas to produce enough insulin, either because of impaired insulin secretion, impaired insulin action, or both.[3]

Diabetes affects more than 300 million people world-wide, and is on the increase.[4] India has emerged as one of

the countries with highest number of diabetes mellitus in the last few decades.

Diabetes was considered a disease of the wealthy in ancient India, and was known as Madhumeha. The ancient Greeks coined the term diabetes, meaning excessive urination with dehydration. Most of the untreated or inadequately treated patients develop acute metabolic complications.

These complications are associated with high mortality and morbidity. Most common among the acute metabolic complications are diabetic ketoacidosis, hyperglycemic hyperosmolar non-ketotic state, lactic acidosis and hypoglycemia. These medical emergencies can be easily prevented diagnosed and treated.[5] Early diagnosis and management of Diabetes Mellitus helps in preventing these complications.

The objectives of the study were to determine the incidence of acute metabolic complications in diabetes mellitus and to determine the distribution of age and sex in different metabolic complications of diabetes mellitus.

METHODS

The current study was a prospective study which included all the cases presenting to Emergency Medicine department of Victoria Hospital for a period of one year from first of April 2014 to 31 March 2015. It is a descriptive study.

Inclusion criteria

Acute metabolic complications developing in both Type I and Type II Diabetes mellitus patients.

Exclusion criteria

- Patients suffering from other acute/chronic complications of diabetes mellitus other than metabolic complications
- Other causes of metabolic disorders not related to diabetic mellitus.

RESULTS

During the period of study 1211 cases of acute metabolic complications in diabetes mellitus were admitted in Emergency Department at Victoria Hospital.

The following were the diagnostic points for diagnosing metabolic disorders in diabetes mellitus patients.

Components of diabetes ketoacidosis[7]

- Hyperglycemia of more than 250 mg/dl
- Ketosis- Urine Ketones present, serum Ketones of more than 1:4 dilution
- Metabolic acidosis- pH of less than 7.3 and bicarbonate less than 15mEq/l

Components of hyperglycemic hyperosmolar nonketotic state[8]

- Hyperglycemic of more than 700mg/dl
- Serum osmolarity more than 320mosmol/l
- Bicarbonate of more than 15mEq/l
- pH more than 7.3.

Components of Lactic acidosis[9]

- serum lactic acid more than 2mmol/l
- Acidosis- pH less than 7.3
- No ketoacidosis

Hypoglycemia

Blood glucose less than 70mg/dl10

- Mild hypoglycemia- 60-69 mg/dl
- Moderate hypoglycemia- 40-59mg/dl
- Severe hypoglycemia-less than 40mg/dl.

Out of the 1211 cases 632 were Diabetes ketoacidosis, 329 cases were hypoglycemia, 201 cases were hyperglycemic hyperosmolar nonketotic state, 12 cases were lactic acidosis.

Table 1: Sex distribution of DKA.

	Males	Females
Number of DKA patients	397	235
Percentage of DKA patients	62.8%	37.2%

Table 2: Age distribution of DKA.

Age (years)	No. of DKA patients	%
Less than 15	411	65.03
15-44	171	27.06
45-64	31	4.9
More than 65	19	3.0
Total	632	100

Table 3: Sex distribution of HHNKS.

	Males	Females
No. of HHNKS patients	75	126
% of HHNKS patients	37.3%	62.7%

The other 37 cases had findings which were overlapping with more than one type of acute metabolic complications related to diabetes mellitus.

The most common association was diabetic ketoacidosis and lactic acidosis which accounted to 24 cases and in 11 cases.

Diabetic ketoacidosis was associated with iatrogenic hypoglycemia. Two cases of HHNKS were associated with attacks of hypoglycemia.

Table 4: Age distribution of HHNKS.

Age (years)	No. of HHNKS patients	%
<15	0	0
15-44	0	0
45-64	30	14.9
>65	171	85.1
Total	201	100

Table 5: Sex distribution of lactic acidosis.

	Males	Females
No. of lactic acidosis patients	5	7
% of lactic acidosis patients	41.7%	58.3%

Table 6: Age distribution of lactic acidosis.

Age (years)	No. of lactic acidosis patients	%
<15	0	0
15-44	1	8.3
45-64	7	58.3
>65	4	33.3
Total	12	100

Table 7: Sex distribution of hypoglycemia.

Hypoglycemia patients	Males	Females
Mild	0 (0%)	0 (0%)
Moderate	48 (14.6%)	37 (11.2%)
Severe	132 (40.1%)	112 (34%)
Total	180 (54.7%)	149 (45.3%)

Table 8: Age distribution of Hypoglycemia.

Age (years)	No. of hypoglycaemia patients	%
<15	46	14
15-44	38	11.5
45-64	116	35.2
>65	129	39.2
Total	329	100

DISCUSSION

Diabetic ketoacidosis was the commonest metabolic complications in our study. Most common age group involved in diabetic ketoacidosis were patients aged less than 15 years, there was also male preponderance of Diabetes mellitus patients suffering from diabetic ketoacidosis. In the study conducted by Nathan DM et al there were similar male predominance and patients aged less than 15 years were commonly involved.[11]

HHNKS occurred commonly in older individuals, aged more than 65 years with female preponderance. Greg stoner et al12 found out that there was a likelihood of elderly females (>65 years) suffering from this complication than the other population groups.

In present study, lactic acidosis was one the rare complications of Diabetes mellitus, it commonly affected the individuals aged more than 45 years. Richy FF et al, found out that lactic acidosis was one of the rare complications of Diabetes mellitus and mostly associated with the use of metformin and more commonly present in patients with renal impairment.[13]

Hypoglycemia is the commonest, Iatrogenic acute complication in Diabetes mellitus patients. Most cases of Hypoglycemia admitted in emergency Department were graded as severe (Blood glucose <40mg/dl). Stanchan et al conducted a similar study in which they also found that the commonest iatrogenic metabolic complication of diabetes mellitus was hypoglycemia.[14] Diabetic ketoacidosis, HHNKS, lactic acidosis and hypoglycemia presented in varying combinations in some patients, similar findings were seen in the study conducted by Cox K et al.[15]

Diabetic ketoacidosis was commonly associated with lactic acidosis. Hypoglycemia was associated with all other metabolic complications of diabetes mellitus.

CONCLUSION

In Tertiary care Centre, the commonest acute metabolic complications are Diabetic Ketoacidosis. It commonly affects Males aged less than 15 years. Hypoglycemia is the commonest iatrogenic acute metabolic complications in Diabetes Mellitus. HHNKS affects patients aged more than 45 years. Lactic acidosis in the rarest acute metabolic complications in Diabetes Mellitus. In some cases, there is considerable overlap of DKA, lactic acidosis, hypoglycemia and HHNKS.

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