

Original Research Article

Comparison of outcome of milwaukee regimen and 48 hours regimen in diabetic ketoacidosis in a tertiary care hospital in Chitradurga, Karnataka, India

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ABSTRACT

Background: Diabetic ketoacidosis (DKA) is an acute life threatening and a medical emergency that accounts for the majority of diabetes related mortality and morbidity in the pediatric age group who are suffering from type 1 Diabetes Mellitus (DM). Objective of this study was to compare the clinical outcome in a patient with DKA who are been treated with Milwaukee regimen (24hours) and 48 hours regimen.

Methods: A retrospective study was conducted in PICU of tertiary care hospital in Chitradurga, Karnataka. Data was collected from 2015 to May 2018. Diagnosis of DKA was made by plasma glucose level higher than 200mg/dl, venous blood PH of <7.3 and /or bicarbonate <15 mmol/L, presence of ketonuria. Among 56 cases, 36 cases were treated with 48 hours regimen and 20 cases were treated with Milwaukee regimen and results were compared.

Results: The median age of presentation was 7.52 years (Range: 2-14 years) with female: male ratio of 1:1.3. Newly diagnosed type 1 DM cases constituted 80.7%. The most common presenting complaints were hurried breathing and altered sensorium. The average length of stay in the ICU was 3.5 days for 48 hours regimen and 4.5 days for Milwaukee regimen. The mortality rate was 10.71 % (6 cases), among which 15% (3 cases) were patients treated with Milwaukee and 8.3% (3 cases) were patients treated with 48 hours regimen. Cerebral edema was found to be the commonest cause of fatality.

Conclusions: There is lack of awareness regarding dog bite and its management among the rural population.

Keywords: Cerebral edema, Diabetic ketoacidosis, Diabetes mellitus, Milwaukee regimen

INTRODUCTION

Diabetic ketoacidosis (DKA) is an important complication of diabetes mellitus, accounting for a majority of deaths related to diabetes in children.¹ It is the presenting feature in the majority of cases of type 1 DM in children. Diabetic ketoacidosis (DKA) in children is defined as hyperglycemia (serum glucose concentration >200 mg/dL) in the presence of metabolic acidosis (blood pH<7.3 with serum bicarbonate level <15 mEq/L) and ketonemia (presence of ketones in the blood).^{2,3}

It may occur in association with infection, other stressors or non-compliance with treatment. The annual incidence of DKA among children with type 1 DM is 1%-5% in western series and accounts for 8-28% of all primary admissions for DM to a hospital.^{4,5} It occurs in 20%-40% of children with known IDDM who omit insulin doses or who have not managed appropriately during an intercurrent illness.¹

Hyperglycemia, metabolic acidosis, ketonemia, dehydration and various electrolyte imbalance result from

a relative or absolute deficiency of insulin with or without an excess of counter regulatory hormone.⁶

Cerebral edema usually manifests after 4-12 hours of treatment.⁷ It is the most common cause of death in a child with DKA. Risk factors for the development of cerebral edema include age less than 5 years, new onset diabetes, prolonged duration of DKA symptoms, and presentation with severe acidosis or severe hypocapnia after adjusting for the degree of acidosis.^{7,8}

The studies pertaining to the Comparison of the outcome of 48 hours regimen and Milwaukee regimen are scant in this part of the country and hence, it was decided to take up this study in order to compare the outcome of Milwaukee regimen (24 hours) and 48 hours regimen in Diabetic Ketoacidosis.

METHODS

This retrospective study was conducted in the Pediatric ICU of Basaveshwara Medical College Hospital & Chitradurga, data was collected from the records. A total of 56 cases, among which 20 cases were treated with Milwaukee Regimen (24hours) and 36 cases were treated with 48 Hours Regimen, which fulfilled the study criteria were included in the study.

Inclusion criteria

All cases of DKA admitted between May 2015 to May 2018 for a period of three years.

Exclusion criteria

- Cases which got discharged against medical advice were excluded from the study.
- Cases who were had started treatment and then referred from other hospitals.

The results were compared. The deficit along with maintenance fluid was corrected over a period of 24 hours in the Milwaukee regimen and 48 hours in 48 hours regimen. All the details were entered into a predesigned proforma and were compiled using a statistical package for social services version 20. The categorical data were presented as frequencies and percentages.

RESULTS

The median age of presentation was 7.52 years (Range: 2-14 years) with a female: male ratio of 1:1.3. 80.7% were newly diagnosed with type 1 DM. 88% of the cases belonged to low socio-economic status. 78% were from rural areas (Figure 1).

Diabetic ketoacidosis is classified as mild, moderate and severe DKA. 64.2% of cases were severe, 26.7% were moderate and 8.9% were mild DKA. Among these 50% severe, 40% moderate and 10% mild DKA cases were

treated according to the Milwaukee regimen(24 hours). 72.2%) severe, 19.4% moderate and 8.3% mild DKA cases were treated with 48 hours regimen (Figure 2).

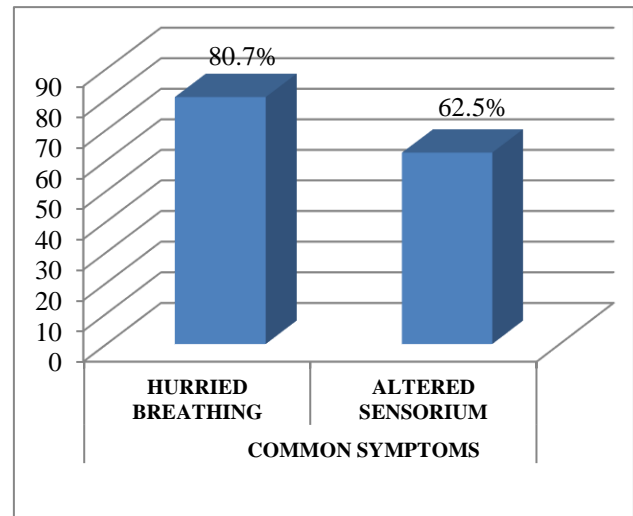


Figure 1: Most common presenting symptoms.

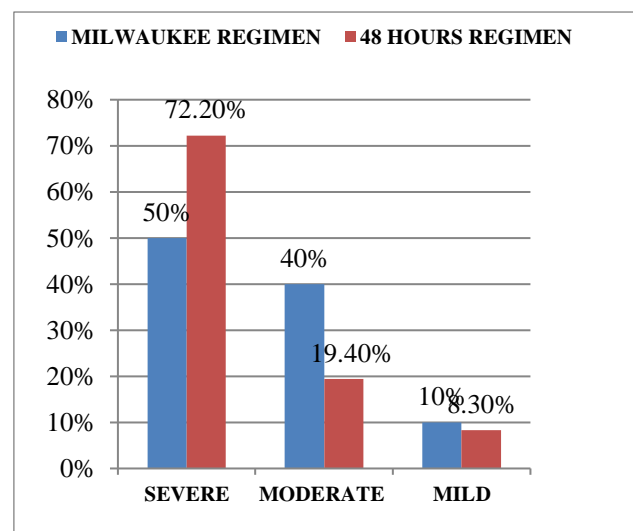


Figure 2: Comparison between severity and treatment regimen.

The average length of stay in the ICU:

- 3.5 days for 48 hours regimen,
- 4.5 days for the Milwaukee regimen.

The mortality rate was 10.71% (6 cases), Among which 15% (3 cases) were patients treated with Milwaukee and 8.3% (3 cases) were patients treated with 48 hours regimen. Cerebral edema was the commonest cause of fatality.

DISCUSSION

DKA is a serious complication of IDDM and a leading cause of admission to hospital in IDDM. Narins RG,

Cohen JJ. et al, showed that the risk of diabetic ketoacidosis in type 1 diabetic Mellitus is 1-10% per person per year.⁹ Mortality is seen to be very high without aggressive management. This study was undertaken in view of comparing the outcome of 48 hours regimen and Milwaukee regimen (24 hours) in Diabetic Ketoacidosis. First, one-year patients were treated following a 24hrs regimen where complications were found to be more, hence we changed to 48 hours regimen.

This study consisted of 56 cases out of which 36 patients were treated with 48hrs regimen and 20 cases were treated with a 24hrs regimen. The median age of presentation was 7.52 years (Range: 2-14 years) which was similar to other studies, which was found to be 6.9 and 7.9 years.^{10,11} The frequency of Diabetic ketoacidosis is higher among boys than girls which was in contrast to a study conducted by Neu et al, which showed that girls had a higher risk of Diabetic Ketoacidosis when compared to boys.¹²

A study conducted by Klein M, Sathasivam A, Novoa Y, Rapaport R et al, reported that hospital admission is indicated in all cases of DKA. Indications for admission to the ICU include the presence of severe DKA or risk factors for cerebral edema such as age <5 yrs and new onset diabetes.¹³

The average length of stay in the ICU is 3.5 days for 48 hours regimen and 4.5 days for the Milwaukee regimen. When compared to other studies mortality rate in our study was high i.e. 10.71%, out of which 15% mortality is observed in the Milwaukee regimen and 8.3% were observed in the 48hrs regimen. cerebral edema was found to be the cause of death in all these cases.

Authors found 48hrs regimen is better when compared to the Milwaukee regimen in terms of cerebral edema and mortality, where slow volume correction is less associated with cerebral edema when compared with rapid correction.

CONCLUSION

Diabetic ketoacidosis being an important cause of morbidity and mortality in children with diabetes mellitus, it's Timely diagnosis, appropriate management, careful monitoring and apprehending complications are critical to ensuring a favorable outcome. Since 48hrs regimen was found to be better, early intervention by this method would help patients better compared to 24 hours regimen.

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Ethical approval: Not required

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