

Differences in the management and outcome of diabetic ketoacidosis in type 1 and type 2 Diabetes

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BACKGROUND

Diabetic ketoacidosis(DKA) is an endocrine emergency with severe financial and healthcare implications .

Although majority of people with diabetes are type 2, it is traditionally accepted that DKA is preponderant in type 1 diabetes.

However, there has been increasing evidence recently stating the rising incidence of DKA in people with type 2 diabetes.

Whilst the data establishing the association between type 1 diabetes and DKA being extensive, studies accrediting the same between type 2 diabetes and DKA is limited in the United Kingdom.

AIMS

1. To measure the prevalence of DKA in type 1 and type 2 diabetes
2. To ascertain if there are differences in the following between both the groups.

- Precipitating aetiology
- Presentation severity
- Management and outcome

METHODS

The study included all people admitted with DKA from October 2014 to September 2020 at Queen Elizabeth Hospital in Birmingham, West Midlands.

Precipitating factors, metabolic parameters on presentation ,duration of DKA, length of hospitalization and metabolic complications during Insulin-Fluid infusion were collected

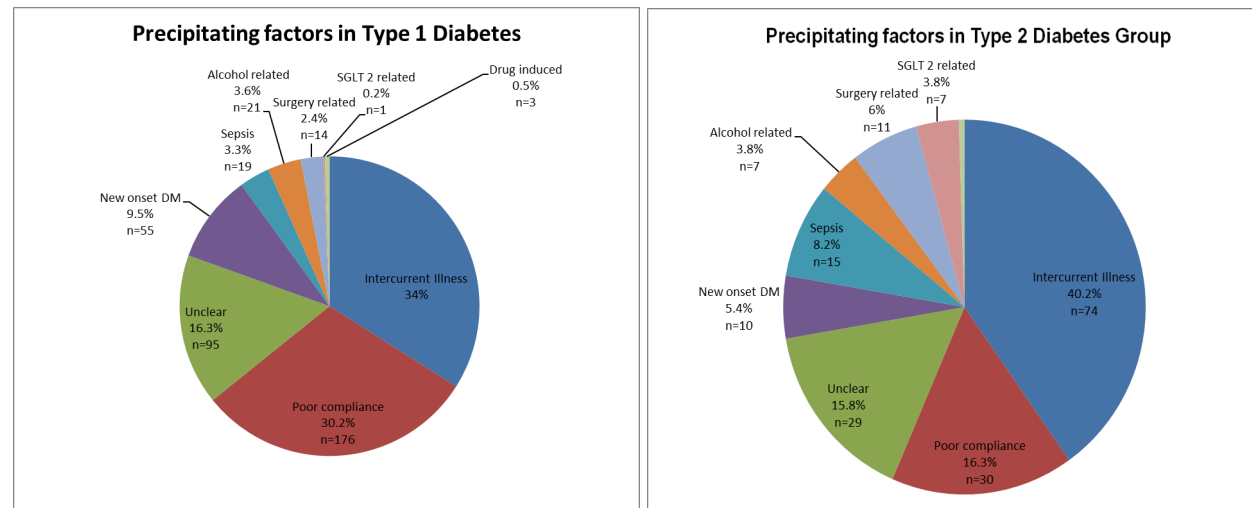
DKA duration was calculated as the time difference between DKA resolution (pH>7.3 and bicarbonate >15 mmol/L; and ketones < 0.6 mmol/L) and DKA diagnosis (blood glucose>11 mmol/L, pH<7.3 or bicarbonate <15 mmol/L and serum ketones >3 mmol/L) expressed in hours.

Length of hospitalization was the difference in discharge and admission date and time expressed in hours.

Observations from the collected figures were analyzed using Stata/SE 16.1 for Mac. Results are presented as median and interquartile, frequencies and proportions where appropriate.

FINDINGS

The pie charts below elucidate the common aetiologies of DKA in both the groups



This table below summarizes the demographics, metabolic profiles including DKA duration and length of stay

Parameters	Total	Type 1 Diabetes	Type 2 Diabetes
Median Age (years)	38.5 (23.9 -57.2)	29.2 (21.9-49.0)	61.8 (52.1-75.2)
Males(n)	376	277	99
Females(n)	390	304	86
Male /Female ratio	1:1.037	1:1.097	1:0.869
pH	7.23 (7.09-7.29)	7.22 (7.09-7.29)	7.24 (7.11-7.3)
Bicarbonate	12.2 (7.2-17.1)	11.9 (7.12-16.7)	13.2 (7.75-17.80)
Glucose	27.7 (19.8-34.8)	28 (20.4-34.73)	26.5 (16.2-35.04)
Lactate	2.6 (1.8-4.2)	2.6 (1.8-4.2)	2.6 (2.07-4.2)
Sodium	133.2 (130-137)	133.0 (133-137)	134.0 (130-137)
Potassium	4.7 (4.1-5.3)	4.7 (4.13-5.32)	4.6 (4.1-5.3)
Urea	7.5 (5.4-11.4)	7.1 (5.1-10.6)	8.9 (6.4-16.7)
Serum Osmolality	310.1 (300.5-321.7)	310.1 (300.6-320.9)	312.1 (300.5-321.7)
% Fluids administered	80	80	80
Dose of Insulin in 24 hours	43.5	48	10
Median DKA duration in hours	13.90 (8.6-21.9)	13.90 (9.1-21.9)	13.9 (7.7-21.1)
Median Duration of Hospitalisation in days	3.9 (1.9-8.8)	2.95 (1.7-6.02)	11 (5-23.1)

DISCUSSION

- 1. Nearly 25% of the patients in the study group were found to have type 2 diabetes
- 2. No significant differences observed in the metabolic parameters on presentation except raised urea in people with type 2 diabetes attributed to their kidney damaging effect .
- 3. Infection and Inter-current illness were the two common precipitating factors in the study group
- 4. Duration of DKA was similar for both type 1 and type 2 diabetes but people with type 2 stayed longer which is explained by their multi comorbid status .
- 5. The amount of fluids and insulin administered to both the groups were similar and no variations noticed .

TAKE HOME MESSAGE

DKA is more common in people with type 1 diabetes but not exclusive of it . It can also present in people with type 2 diabetes .

The time tested therapy with concomitant fluids and Insulin infusion remain the cornerstone of management in DKA irrespective of the type of diabetes

REFERENCES

1. Zhong *et al* ;Trends in Hospital Admission for Diabetic Ketoacidosis in Adults With Type 1 and Type 2 Diabetes in England, 1998–2013: A Retrospective Cohort Study.
2. Balasubramanyam *et al* ; New profiles of diabetic ketoacidosis: type 1 vs type 2 diabetes and the effect of ethnicity

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