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High prevalence of Afro-Caribbean ethnicity and hypoglycaemia in patients with diabetes and end stage renal disease hospitalized with COVID-19

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Abstract

End stage renal disease (ESRD) is associated with a high mortality rate among patients hospitalized with COVID-19. To the best of our knowledge, there is limited data on the clinical features, ethnicity, inpatient glycaemic control and outcomes in patients with diabetes related ESRD in the literature. We report the clinical features and outcomes of 39 consecutive ESRD patients (28 on haemodialysis [HD] and 11 with renal transplant) secondary to diabetic kidney disease admitted to a university hospital with COVID-19. We observed a high prevalence of patients of Afro-Caribbean ethnicity hospitalized with COVID-19 with a 73% and 54% prevalence in renal transplant and HD groups respectively. The mortality rate of our cohort was 36%. Nearly a one-third of HD patients and one-fifth of transplant patients had hypoglycaemic events during COVID-19 hospitalization. Adjustment of diabetes treatment was frequently required. Our data highlight the importance of integrated multidisciplinary care of patients with diabetes related ESRD hospitalized with COVID-19.

KEYWORDS

COVID-19, diabetes, end stage renal disease, ethnicity, haemodialysis, hypoglycaemia, renal transplant

End stage renal disease (ESRD) is associated with a high mortality rate among patients hospitalized with COVID-19.¹ In people with diabetes admitted with COVID-19, male, age, obesity and admission blood glucose levels are associated with poor outcomes.^{2,3} To the best of our knowledge, there is limited information on the clinical features, impact of ethnicity, prevalence of hypoglycaemia, diabetes treatment changes and outcomes in patients with diabetes related ESRD requiring renal transplant or haemodialysis (HD) hospitalized with COVID-19.

We report the clinical features and outcomes from 39 consecutive patients with diabetes and ESRD (renal transplant [n = 11] or HD [n = 28]) hospitalized due to COVID-19 infection between March and April 2020 at one university teaching hospital in London. Patients were predominantly male (56%) with a median age of 62 (range 23-91) years. The majority (80%) had type 2 diabetes (n = 31) with 8

patients with type 1 diabetes (20%). The median duration of diabetes was 21 (range 7-46) years. More than half of the cohort were of African-Caribbean ethnicity (64%), with 19% Caucasian and 17% of other ethnicities respectively. Median HbA1c was 7% (range 5.2-16.7) (53 mmol/L, range 33.3-159). Clinical and laboratory features of the transplant and HD groups are shown in Table 1. Of the 39 patients, 5 patients were admitted to intensive care unit (ICU), and 14 (36%) died with a median time to death of 5.5 (range 2-98) days. None of the patients presented diabetic keto-acidosis or hyperosmolar hyperglycaemic state. During hospitalization, five patients needed insulin as a new treatment and three patients needed an increase in their insulin doses.

When comparing patients with renal transplant with those on HD, transplant patients were younger (58 vs 66 years old

TABLE 1 Presenting clinical characteristics, laboratory features and outcomes of 39 patients with diabetes and ESRD (renal transplant or haemodialysis) hospitalized with COVID-19

	Renal transplant N = 11	Haemodialysis N = 28
Age, years	58 (35-82)	66 (23-91)
Sex, male	6 (55%)	16 (57%)
Type of diabetes		
Type 1	5 (45%)	3 (11%)
Type 2	6 (55%)	25 (89%)
Duration of diabetes, years	25 (7-41)	21 (10-46)
HbA1c, %	6.8 (5.6-9.6)	6.7 (5.2-16.7)
Ethnicity		
Caucasian	3 (27%)	4 (14%)
Afro-Caribbean	8 (73%)	15 (54%)
Other	0	9 (32%)
Known hypertension	9 (82%)	28 (100%)
Known retinopathy	11 (100%)	28 (100%)
Know macrovascular complications	7 (64%)	17 (61%)
Active or ex-smoker	0	2 (7%)
Obesity (BMI >30 kg/m ²)	3 (27%)	11 (40%)
ICU admission	2 (18%)	3 (11%)
Intubation	1 (9%)	2 (7%)
Death	4 (36%)	10 (36%)
Time to death, days	16 (2-36)	5 (2-98)
Length of hospitalization, days	13.5 (1-59)	8.5 (1-98)
Insulin initiated as new treatment	4 (44%)	1 (4%)
Diabetes treatment changes during hospitalization		
Reduced	0	7 (25%)
Increased	5 (45%)	3 (11%)
Unchanged	6 (55%)	18 (64%)
Hyperglycaemia	0 (0%)	7 (26%)
Hypoglycaemia	2 (18%)	9 (33%)
Fever and/or respiratory symptoms	10 (91%)	19 (68%)
White blood cells, ×10 ⁹	7.0 (3.6-9.0)	5.8 (3.6-28)
Lymphocytes, ×10 ⁹	0.5 (0.4-1.3)	0.8 (0.2-3.2)
Neutrophils, ×10 ⁹	4.7 (2.8-8.3)	5.4 (0.9-27.8)
Platelets, ×10 ⁹	207 (59-370)	206 (84-411)
Glucose, mmol/L	5.9 (4.3-9.1)	8.4 (4.7-15.6)
eGFR, mL/min	38 (7-76)	9 (5-22)
Creatinine, μmol/L	245 (95-792)	500 (101-899)

Note: Median (range) shown or n (%).

Abbreviations: BMI, body mass index; eGFR, estimated glomerular filtration rate.

SUMMARY AT A GLANCE

This report stated the clinical features and outcomes of 39 ESKD patients with diabetes and admitted with COVID-19 infection. The mortality rate was about 36%. There is a high prevalence of patients of Afro-Caribbean ethnicity. Hypoglycaemic events were observed in nearly one third of HD patients and one fifth of transplant patients during hospitalization.

respectively) with a higher prevalence of African-Caribbean ethnicity (73% vs 54%) and with type 1 diabetes (45% vs 11% respectively). However, due to the small number of patients, formal statistical analysis was not performed. Sex, glycaemic control as determined by HbA1c and duration of diabetes were similar.

Renal transplant patients were more likely to present with fever and respiratory symptoms (91% vs 68%) and be admitted to ICU (18% vs 11%). The mortality rate was equivalent (36%) in both groups. However duration of hospitalization (which included data from those who died) was longer in transplant patients (13.5 vs 8.5 days) as was the time to death (16 vs 5 days).

Interestingly, more patients needed insulin as a new treatment in the transplant group. Treatment de-escalation (defined as reduction in insulin doses or treatments from admission) was more frequent in HD as compared with transplant patients. Hyperglycaemia (defined as glucose ≥ 15 mmol/L [>270 mg/dL] minimum two times in the first 5 days) was reported more often in HD patients as compared with transplant patients. Hypoglycaemia (defined as ≤ 3.9 mmol/mol [<70 mg/dL]) was observed in 33% of HD and 18% of transplant patients and one patient in each group experienced a level 2 hypoglycaemia (ADA definition of glucose <3.0 mmol/L [54 mg/dL]). Hypoglycaemia was not significantly associated with mortality. None of the patients in our cohort were fasting for Ramadan or were on chloroquine treatment or high dose corticosteroids.

Our mortality data and presenting clinical features are similar to those of a recent report of 59 ESRD patients (69% with type 2 diabetes) who were predominantly of Hispanic origin.¹ In this study, the majority of patients were on HD with only 8% (n = 5) with renal transplant, and diabetes specific outcomes and treatment changes during hospitalization were not reported. Other studies in very small cohorts (less than 10 patients) with ESRD and COVID-19 have also not reported on diabetes specific data or treatment changes during hospitalization.^{4,5} An Italian study in 46 patients,⁶ predominantly Caucasian patients on HD (n = 21), renal transplant (n = 20) or with acute kidney injury (n = 5), reported a mortality rate of 24%. The mean length of hospitalization was longer in their HD group than in our cohort (12 vs 8.5 days). This study, however, did not describe prevalence of

diabetes in the cohort or rates of hyper or hypoglycaemia during hospitalization. Patients with renal transplant in our cohort had raised creatinine levels at time of admission. We speculate that this may be related to known impact of COVID-19 causing acute kidney injury and renal dysfunction.

We also observed in our cohort a high prevalence of patients of Afro-Caribbean ethnicity hospitalized with COVID-19 with a 73% and 54% prevalence in renal transplant and HD groups respectively. This markedly contrasts with the much lower prevalence of Afro-Caribbean people in the renal transplant population attending our hospital for routine care (18% of renal transplant and 42% of HD patients of Afro-Caribbean origin).⁷

We acknowledge the limitations of our study which is a single centre study in a relatively small selected high-risk cohort. However, the number of patients we studied is larger than many recent reports of the clinical impact of COVID-19 in patients with ESRD.

To the best of our knowledge, our study is the first to provide information on diabetic treatment changes, impact of Afro-Caribbean ethnicity and prevalence of hyper and hypoglycaemia during hospitalization for patients with diabetes and ESRD hospitalized with COVID-19.

In a population at high risk of hypoglycaemia, we observed that nearly a one-third of HD patients and one-fifth of transplant patients had hypoglycaemic event during COVID-19 hospitalization. The mortality rate of our cohort was high at 36% and inpatient optimization of diabetes treatment was frequently required. Afro-Caribbean patients with ESRD are disproportionately represented in the cohort hospitalized with COVID-19. Our data highlight the importance of integrated multidisciplinary care of patients with diabetes related ESRD hospitalized with COVID-19.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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