

Sugar Is Not Always Sweet: Exploring the Relationship Between Hyperglycemia and COVID-19 in a Predominantly African American Population

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Introduction: A relationship between hyperglycemia and outcomes in patients with COVID-19 has been proposed, however there is a paucity of literature on this. In this study, we examined the effect of admission glucose in diabetics and non-diabetics on outcomes in patients hospitalized with COVID-19. Our study uniquely examines this association in a largely African American cohort, a population disproportionately affected by COVID-19.

Methods: In this retrospective cohort study, we analyzed all adults admitted with COVID-19 to a designated COVID hospital in Brooklyn, NY from March 1 to May 15, 2020. Diabetics were compared to non-diabetics, and were further stratified based on admission glucoses of 140 and 180 mg/dL. Diagnosis of diabetes was based on history and/or Hba1c > 6.5%. Univariate, multiple and logistic regressions were used for analyses, examining outcomes of mortality, intubation, ICU admission, acute kidney injury (AKI), and length of stay based on admission glucose levels, while controlling for age, gender, lab values (serum creatinine and WBC), and comorbidities including hypertension, cardiovascular disease, and obesity. Outcomes are presented as an adjusted odds ratio (OR) with 95% confidence interval (95% CI).

Results: 708 patients were analyzed; 54% diabetics, 83.5% non-Hispanic Blacks, 51% male with a mean age of 68, BMI of 29 kg/m² and crude mortality rate of 40%. The length of hospital stay was greater in diabetics than non-diabetics, (13±26 days vs 9.5±18.5 days, p<0.05). Diabetics with an admission glucose > 140 mg/dL (vs <140 g/dL) had a 2.4-fold increased odds of both intubation and ICU admission (95% CI: 1.2, 4.5; 1.3, 4.6). Diabetics with admission glucoses > 180 mg/dL (vs <180 g/dL) had a 1.8-fold increased mortality (95% CI: 1.2, 2.9). Non-diabetics with admission glucoses >140 mg/dL (vs <140 g/dL) had a two-fold increased mortality (95% CI: 1.2, 3.5), 3.5-fold increased odds of ICU admission (95% CI: 1.8,6.6) and a 2.3-fold increased odds of both intubation and AKI (95% CI: 1.3, 4.2; 1.3,4.2). Non-diabetics with a glucose >180 mg/dL (vs <180 g/dL) had a four-fold increased mortality (95% CI: 1.8, 8.8), 2.7-fold increased odds of intubation (95% CI: 1.3, 5.6) and 2.9-fold increased odds of ICU admission (95% CI: 1.3, 6.2).

Conclusion: Our results show hyperglycemia portends worse outcomes in diabetics and non-diabetics with COVID-19. Elevated admitting glucoses >180 mg/dL increased odds of mortality four-fold in non-diabetics and 1.8- fold in diabetics. In COVID-19, diabetic patients had a 37% greater length of hospital stay than non-diabetics. Whether hyperglycemia is a marker or a cause of more severe COVID-19 is unknown. These findings suggest that patients presenting with hyperglycemia require closer observation and more aggressive therapies. This raises the testable hypothesis that intensive glucose control may improve outcomes in patients with COVID-19.