

Prednisolone-Induced Hyperglycemia Most Prominent Later in the Day

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Hyperglycemia caused by prednisolone use occurs primarily in the afternoon and evening, and this is when treatment for the hyperglycemia should be carried out....

Hyperglycemia, including that caused by glucocorticoids, is an independent predictor of higher mortality in hospital patients. Patients are often treated for glucocorticoid-induced hyperglycemia, but conventional strategies may not work. Cushing's syndrome (i.e., excess endogenous glucocorticoids) generally leads to an increase in postprandial glucose concentration. If a similar effect occurs with exogenous glucocorticoids, then the conventional strategy of using long-acting basal insulin with prandial and correctional rapid-acting insulin may fail to treat postprandial hyperglycemia and lead to nighttime hypoglycemia.

Morton Burt, MBChB, FRACP, PhD, from the Southern Adelaide Diabetes and Endocrine Services, Repatriation General Hospital, Australia, and colleagues set out to determine the circadian effect of prednisolone on glucose concentration. They hoped to use that information to help therapeutic management of prednisolone-induced hyperglycemia. The researchers conducted a cross-sectional study in a teaching hospital that included 60 patients with chronic obstructive pulmonary disease (COPD) who had been admitted to the hospital. Thirteen patients had no known diagnosis of diabetes, were admitted for conditions other than COPD, and were not treated with glucocorticoids (group 1), and 40 patients without diabetes were admitted with exacerbations of COPD and were treated with prednisolone (group 2, prednisolone = 30 ± 6 mg/day). Seven patients with COPD and known diabetes were treated with prednisolone (group 3, prednisolone = 26 ± 9 mg/day).

Use of a continuous glucose monitoring system (CGMS) revealed that more participants in group 2 (21/40 [53%]; $P = .02$) and group 3 (7/7 [100%]; $P = .003$) reached a glucose level of at least 200 mg/dL (≥ 11.1 mmol/L) compared with 1 (8%) of 13 patients in group 1. Group 3 had a higher mean glucose concentration between 2400 and 1200 hours (142 ± 36 mg/dL) than the other groups ($P < .005$), but there was no significant difference in glucose concentration difference between group 1 (108 ± 16 mg/dL) and group 2 (112 ± 22 mg/dL). Between 1200 and 2400 hours, mean glucose concentrations were higher in group 2 (142 ± 25 mg/dL) and group 3 (189 ± 32 mg/dL) than in group 1 (117 ± 14 mg/dL; $P < .05$ for both comparisons).

Limitations of the trial include its cross-sectional design and narrow dose range of prednisolone. In addition, the group placement of participants was based on a single glucose measurement, use of CGMS may underestimate blood glucose at low glucose concentrations, and there was a reliance on ward nursing staff to calibrate the CGMS.

"This study demonstrates that approximately 50% of hospitalized patients with COPD without known diabetes treated with prednisolone record a glucose concentration of at least 200 mg/dl (11.1 mmol/liter)," the authors conclude. "Hyperglycemia predominantly occurs in the afternoon and evening. Screening for prednisolone-induced hyperglycemia should be directed at this time of the day, and any resulting treatment should also be focused on this interval."

