Is a Raised Bicarbonate, Without Hypercapnia, Part of the Physiologic Spectrum of Obesity-Related Hypoventilation?

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BACKGROUND: Obesity hypoventilation syndrome (OHS) conventionally includes awake hypercapnia, but an isolated raised bicarbonate, even in the absence of awake hypercapnia, may represent evidence of "early" OHS. We investigated whether such individuals exhibit certain features characteristic of established OHS.

METHODS: Obese subjects (BMI > 30 kg/m^2) were identified from a variety of sources and divided into those with (1) normal blood gas measurements and normal acid-base balance, (2) an isolated raised base excess (BE) (≥ 2 mmol/L), and (3) awake hypercapnia (> 6 kPa; ie, established OHS). Two-point ventilatory responses to hypoxia and hypercapnia were performed. Polygraphic sleep studies were done to identify intermittent and prolonged hypoxia.

RESULTS: Seventy-one subjects (BMI, 47.2; SD, 9.8; age, 52.1 years; SD, 8.8 years) were recruited into three groups (33, 22, and 16 respectively). The $PaCO_2$ and BE values were 5.15, 5.42, 6.62 kPa, and +0.12, +3.01, +4.78 mmol/L, respectively. For nearly all the ventilatory response and sleep study measures, group 2 (with only an isolated raised BE) represented an intermediate group, and for some of the measures they were more similar to the third group with established OHS.

CONCLUSIONS: These data suggest that obese individuals with a raised BE, despite normocapnia while awake, should probably be regarded as having early obesity-related hypoventilation. This has important implications for clinical management as well as randomized controlled treatment trials, as they may represent a group with a more reversible disease process.

TRIAL REGISTRY: ClinicalTrials.gov; No.: NCT01380418; URL: www.clinicaltrials.gov

CHEST 2015; 147(2):362-368