Brief Report

Vitamin deficiencies in acutely intoxicated patients in the ED

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Abstract

Objective: Physicians often administer intravenous multivitamins to intoxicated patients in the emergency department (ED); however, this practice is not supported by evidence from any prior study. We determined the prevalences of vitamin deficiencies in patients presenting to our ED with alcohol intoxication.

Methods: This study was a prospective, cross-section, observational study of a convenience sample of ED patients presenting with acute alcohol intoxication. Patients were tested for B12, folate, and thiamine levels as add-ons to their blood samples.

Results: Seventy-seven patients were included in the final analysis. The mean age was 46 years, and 19% were female; the mean blood alcohol level was 280 mg/dL. Of 75 patients, no one (0%) had low B12 or folate levels (95% confidence interval, 0-0.05); 6 (15%) of 39 patients had low thiamine levels (95% confidence interval, 0.06-0.31). Of these 6 patients, none exhibited clinical signs of thiamine deficiency.

Conclusions: In our ED, patients with acute ethanol intoxication do not have B12 or folate deficiencies. A significant minority (15%) of patients have thiamine deficiency; its clinical significance is unclear. Widespread administration of multivitamins is unwarranted by these findings, but thiamine may be considered.

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1. Introduction

Patients with chronic alcohol abuse have been historically described as malnourished and vitamin deficient [1,2]. Vitamin deficiencies can lead to serious medical conditions, such as Wernicke encephalopathy and megaloblastic anemia. Faced with these potentially reversible medical problems, it is common practice for emergency medicine physicians to give all patients who are acutely intoxicated a banana bag, often when the chronicity of alcohol usage is unknown. The contents of a banana bag may vary among institutions, but it is generally a concoction of intravenous fluids supplemented with intravenous multivitamins, thiamine, and magnesium. To our knowledge, no prior study had examined the prevalences of vitamin deficiencies in intoxicated emergency department (ED) patients. There was only a single study on the prevalence of folate deficiency in this ED subpopulation, where the authors found that folate deficiency was not significantly higher in patients with alcohol-related illnesses [3]. Thus, this practice has not been supported by evidence, and several studies have suggested that patients with alcohol intoxication or alcohol dependency are not more prone to vitamin deficiency than other ED patients [3-5]. We determined the prevalences of vitamin deficiencies (specifically B12, folate, and thiamine) in patients presenting to the ED with acute alcohol intoxication.

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2. Methods

We conducted a prospective, observational study of a convenience sample of ED patients at an urban teaching hospital with an active emergency medicine residency program. For the purposes of this study, alcohol refers to ethanol, and intoxication refers to acute ethanol intoxication. Patients were included in the study if they presented to the ED with acute alcohol intoxication and they had blood tests drawn as part of routine care. Acute alcohol intoxication was defined as clinical evidence of intoxication as determined by the treating physician and supported by a detectable blood alcohol level (BAL). Clinical evidence of intoxication included (but was not limited to) ataxia, loquaciousness, slurring of speech, combativeness, or lethargy.

Patients were enrolled by the authors during their clinical shifts, which consisted of 8- and 12-hour shifts on a rotation schedule; thus, patients were enrolled at all hours of the day, including weekends. Informed consent was waived. Patients were tested for B12, folate, and thiamine levels as add-ons to their blood specimens. In our laboratory, B12 levels of 200 to 730 ng/L, folate levels of 2.8 to 13.5 μg/L, and thiamine levels of 87 to 280 nmol/L were considered normal (Quest Diagnostics, Virginia). Demographic and clinical data were recorded (age, sex, ethanol level, ED visit dates). A past ED visit was considered recent if it was within the last 28 days from the date of admission to the ED. Patients with multiple ED visits during the study period were enrolled once at the first encounter.

The primary outcomes were the prevalences of vitamin deficiencies. The study was initially designed as a comparison study between acutely intoxicated ED patients and age- and sex-matched ED patients without intoxication. We planned to enroll intoxicated patients first, and if the prevalence of any vitamin deficiency was zero, we would forego the second portion of the study. We estimated that 150 patients (75 intoxicated and 75 without intoxication) were needed for the study, based on a vitamin deficiency prevalence of 20% in intoxicated patients, a vitamin deficiency prevalence of 5% in nonintoxicated patients, a 2-tailed α of .05, and a β of .2. After enrollment of the 75 intoxicated patients, the interim analysis revealed that the prevalences of B12 and folate deficiencies were zero, and the second portion of the study was not pursued. Data were analyzed by simple means and proportions with 95% confidence intervals (CIs) using Excel (Excel X for Mac, Redmond, WA) and SPSS (version 14.0, Chicago, IL). The study was approved by our institutional review board.

3. Results

Eighty-three patients were enrolled over a 4.5-month period from June to November 2006. Six patient encounters were excluded as repeat visits during the study period, leaving 77 patients for analysis. The mean age was 46 years (range, 19-78 years; standard deviation [SD], 14), 19% were female, the mean BAL was 280 mg/dL (range, 23-560; SD, 120). Seven patients included in the study had recent visits that occurred before the study period.

Our sample of patients had a wide range of BALs (Fig. 1). There were patients with relatively low BAL (8 patients with BAL <100 mg/dL), patients with rather high BAL (12 patients with BAL ≥400 mg/dL), and many alcohol levels in between (9 patients with BAL of 100-199 mg/dL; 28 patients, 200-299 mg/dL; and 20 patients, 300-399 mg/dL).

B12 and folate levels were completed in 75 patients; thiamine levels were completed in 39 patients. The remaining patients did not have levels completed because there were insufficient specimens to add on these tests. B12 levels ranged from 282 to 2000 ng/L, with a mean of 603 ng/L (SD, 285 ng/L). Folate levels ranged from 3.6 to 24 μg/L, with a mean of 14 μg/L (SD, 5.9 μg/L). Thiamine levels ranged from 52 to 494 nmol/L, with a mean of 130 nmol/L (SD, 69 nmol/L). The distribution of vitamin levels in our sample is shown in Figs. 2-4.

No patient had low B12 or folate levels (0/75, 0%; 95% CI, 0-0.05). A minority proportion of patients had low thiamine levels (6/39, 15%; 95% CI, 0.06-0.31). Most of the patients with low thiamine levels had borderline low levels (52, 64, 65, 74, 78, and 82 nmol/L). None of the 6 patients with low thiamine levels exhibited symptoms or signs of thiamine deficiency (ie, they had normal cardiovascular and neurologic examinations when they became sober). Of the 6 patients, 4 were asymptomatic on presentation to the ED except for alcohol intoxication. One patient was admitted for chest pain and alcohol withdrawal later in his ED course and had a negative inpatient workup for cardiovascular disease. One patient had underlying epilepsy and presented with a seizure; the patient was observed and subsequently
discharged from the ED without further symptoms. No patient had megaloblastic anemia.

4. Discussion

In this sample of ED patients with acute alcohol intoxication, the prevalences of B12 and folate deficiencies were nonexistent. A significant minority (15%) of patients had low levels of thiamine, although the clinical relevance of this finding is unclear.

Most of the patients in our sample had relatively high BALs. More than three-quarters (78%) of the patients had a BAL of 200 mg/dL. It is likely that most of the patients in our sample had a high tolerance of alcohol. A small portion (5%) of the sample had a BAL less than 50 mg/dL and may represent nontolerant patients because they presented with clinical evidence of alcohol intoxication. Although it may be argued that patients with such low BALs are unlikely to be clinically intoxicated, we do not believe this to be true. Alcohol intoxication is a clinical syndrome, and nontolerant individuals may be impaired at a relatively low BAL [6]. In a post hoc analysis, if we were to exclude patients with BAL less than 50 mg/dL from our analysis, the prevalences of B12 and folate deficiencies would remain the same at zero, whereas the prevalence of thiamine deficiency would be slightly lower (5/38, 14%). The patient with the lowest BAL (23 mg/dL) also had the lowest thiamine level (52 nmol/L) in the study.

We recorded ED visit dates to ascertain the proportion of patients who might have received intravenous multivitamins in a prior visit to our ED, which is a potential confounder. A small proportion of our patients had a recent visit (7 patients, 9%). In a review of their medical records, 3 of the 7 patients received the banana bag during their prior ED visit. It is therefore unlikely that the prevalences of vitamin deficiencies were low in our sample because of prior administration of intravenous vitamins. Of particular interest, 1 of the 3 patients who received a banana bag recently (including 100 mg of thiamine) had a thiamine level of 64 nmol/L, the second lowest in our sample. This patient received the banana bag 27 days before his enrollment in the study. The 2 other patients received the banana bag 4 and 15 days before their enrollment; one had a thiamine level of 124 nmol/L, the remaining patient did not have a thiamine level tested. The 3 patients had high levels of folate (22.5, 24, and 24 μg/L) but variable levels of B12 (419, 683, and 741 ng/L).
In the clinical use of banana bags, there may be a discrepancy between the intended target population and the actual target population. In our experience, physicians are more likely to prescribe banana bags indiscriminately to any patient who is intoxicated rather than try to ascertain which patients were chronic drinkers at a time when an accurate history is often unattainable. Thus, we designed our study to examine the actual target population of banana bags (ie, all intoxicated patients) rather than the intended target population (ie, chronic alcoholics).

There were several limitations to our study. Foremost, approximately half of the patients in the sample did not have thiamine levels completed. The cause was an unforeseen technical problem. At our institution, thiamine levels were send-out tests. The specimens required special handling procedures, and frequently, the laboratory was not able to add on thiamine levels to existing specimens. Second, our institution is an urban municipal hospital. Most of our intoxicated patients are chronic drinkers with poor social supports, and many patients in our study were regulars; thus, our findings may not be generalizable to other institutions. Third, although we recorded visit dates in our ED, we did not know if our patients had visited other EDs and received intravenous multivitamin supplementation elsewhere. In addition, we did not determine the drinking habits of our patients, that is, the chronicity of their alcohol use. We did not ask CAGE questions to determine the extent of their alcoholism. We also did not inquire as to the types of alcoholic beverages consumed by our patients, and this may have had an effect on our study, particularly because some beer is reputed to be fortified with high levels of B12 and folate. Finally, because we did not pursue the second part of our study, we do not know the prevalence of thiamine deficiency in our general population as compared with intoxicated patients.

5. Conclusions

Patients presenting to our ED with acute ethanol intoxication do not have B12 and folate deficiencies. A significant minority (15%) of patients have thiamine deficiency; its clinical significance is unclear. Widespread administration of multivitamins is unwarranted by these findings, but thiamine may be considered.

References