REUE | Original Article

Thiamine in acute alcohol poisoning

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BACKGROUND AND OBJECTIVE. Thiamine is indicated for treating and preventing Wernicke encephalopathy and should be administered in cases of chronic alcoholism or malnutrition. This study evaluated whether thiamine is used appropriately in patients with acute alcohol poisoning.

MATERIAL AND METHODS. Retrospective study of all patients treated for acute alcohol poisoning in a university hospital emergency department in 2021. We collected patient characteristics, means of transport to the hospital, psychiatric history, prior history of alcohol poisoning, clinical characteristics, and concomitant use of other toxic substances. Cases were distributed into 2 groups (thiamine vs no thiamine administered) for analysis of whether the use was indicated or not. We also explored differences in characteristics between the groups.

RESULTS. A total of 341 patients were treated for acute alcohol poisoning. Thiamine was administered in 98 cases (28.7%) and was correctly indicated in 78 (79.6%). Thiamine-group patients were older on average (mean [SD] age, 42.9 [13.6] years vs 34.1 [15.3] years in the no-thiamine group, $P < .001$) and more were men (36.6%) than in the no-thiamine group (15.2%) ($P < .001$). A score of less than 9 on the Glasgow Coma Scale was more common in the thiamine group (52.9% vs 26.8% in the no-thiamine group; $P = .027$). Other characteristics that were more common in patients treated with thiamine were a history of prior alcohol poisoning (79.6% vs 44%, $P < .001$) and psychiatric events (29.6% vs 18.5%; $P = .025$).

CONCLUSIONS. Thiamine is administered in more than a quarter of patients treated for acute alcohol poisoning. Its use is usually indicated. Older age, male sex, a history of psychiatric events, and prior alcohol poisoning are associated with administering thiamine.

Keywords: Acute alcohol poisoning. Thiamine. Emergency department.

Utilización de tiamina en las intoxicaciones alcohólicas agudas

INTRODUCTION. La tiamina es un fármaco indicado en el tratamiento y prevención de la encefalopatía de Wernicke, que debe administrarse en caso de alcoholismo crónico o de malnutrición. Se evaluó el uso de la tiamina durante la asistencia de pacientes con intoxicación alcohólica aguda y si éste era adecuado.

MATERIAL Y MÉTODOS. Estudio retrospectivo de todos los pacientes atendidos en el servicio de urgencias de un hospital universitario por intoxicación alcohólica aguda durante el año 2021. Se recogieron datos de filiación, forma de acceso a urgencias, lugar e intención de la intoxicación, antecedentes psiquiátricos y de intoxicaciones previas, clínica y consumo concomitante de otros tóxicos. Los pacientes se dividieron en dos grupos según se había administrado tiamina o no, se determinó si la indicación era correcta y se evaluó la presencia de factores asociados a su administración.

RESULTADOS. Se atendieron 341 pacientes. Se administró tiamina en 98 casos (28,7%). En 78 (79,6%) estaba correctamente indicada. Los pacientes a los que se les administró eran de mayor edad [42,9 (13,6) *vs* 34,1 (15,3) años; $p < 0,001$] y preferentemente varones (36,6% *vs* 15,2%; $p < 0,001$). Una puntuación inferior a 9 en la escala de Glasgow se asoció al uso de tiamina (52,9% *vs* 26,8%; $p = 0,027$), así como la existencia de intoxicaciones previas (79,6% *vs* 44%, $p < 0,001$) y de antecedentes psiquiátricos (29,6% *vs* 18,5%; $p = 0,025$).

CONCLUSIONES. La tiamina se administra en más de una cuarta parte de las intoxicaciones alcohólicas, la mayoría de forma correcta. La edad, el sexo masculino y los antecedentes de patología psiquiátrica y de intoxicaciones previas se asocian a su uso.

Palabras clave: Intoxicaciones alcohólicas agudas. Tiamina. Servicio de Urgencias.

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Article Information: Received: 3-6-2023. Accepted: 20-6-2023. *Online:* 27-6-2023.
Editor in Charge: Guillermo Burillo-Putze.

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Introduction

Acute alcohol intoxications represent the most frequent reason for consultation due to poisoning in adult patients in Spanish emergency departments (EDs).[1-4] In half of the cases, intoxication is solely due to ethyl alcohol, but in the remaining cases it is associated with the use of illegal drugs of abuse.[1-5] Management of a patient with acute alcohol intoxication is based on supportive measures, with special attention to the level of consciousness, and no specific antidotes exist for its treatment.

Thiamine is a drug indicated in the treatment and prevention of Wernicke's encephalopathy, and should be administered in cases of chronic alcoholism or malnutrition. In fact, it is not included in the recommendations for stocking basic antidotes used in the care of poisoned patients in EDs,[6] it does not appear in the antidote guide published by the Catalan Department of Health,[7] and the Spanish Toxicology Foundation discourages its use in the care of patients with acute alcohol intoxication.[8] Exceptionally, when acute alcohol intoxication occurs in patients with a clear profile of chronic alcoholism or with evident signs of nutritional deficits, IV administration prior to giving a glucose solution may be indicated, to avoid Wernicke's encephalopathy. In all other cases of acute alcohol intoxication, its use provides no benefit.

The aim of this study is to describe the use of thiamine during the management of patients with acute alcohol intoxication, determine whether this use is appropriate, and evaluate the presence of factors associated with its administration.

Material and methods

We conducted a retrospective observational study including all patients treated in the ED of a teaching hospital for acute alcohol intoxication during 2021. The diagnosis required a recent history of alcohol consumption plus the presence of one of the following symptoms or signs: behavioral changes, slurred speech, lack of coordination, unsteady gait, nystagmus, decreased consciousness, mood changes, logorrhea, irritability, or impaired attention and/or memory. Data collected included demographic information (age and sex), mode of arrival to the ED (self-presented or ambulance), place of intoxication (home or public space), intent of intoxication (recreational or suicidal), clinical presentation upon ED arrival (decreased consciousness, agitation requiring medication or physical restraint, or other symptoms), psychiatric history, previous intoxications (both alcohol-related and due to illegal drugs), and concomitant use of other toxic substances. Patients were categorized into 2 groups according to whether thiamine had been administered or not, determining whether the indication was correct and assessing the presence of factors associated with its administration. Thiamine administration was considered indicated if the patient had a profile consistent with chronic alcoholism or signs of nutritional deficits. Assessment of nutritional status and chronic alcoholism was performed through review of the health record, considering daily alcohol use and the number of previous ED visits for alcohol intoxication.

Our department has ethics committee authorization for the study of acute intoxications treated in the ED.

Statistical analysis was performed using SPSS v.15.0 for Windows. Student's t-test or Mann–Whitney U-test was used to compare quantitative variables, and the chi-square test with Fisher or Pearson correction, when necessary, to compare proportions. Results are expressed as number (percentage) or mean (standard deviation). Statistical significance was set at $P < .05$.

Results

During 2021, a total of 341 acute alcohol intoxications were treated, of which 216 (63.3%) occurred in men and 125 (36.7%) in women. A total of 81 patients (23.8%) combined alcohol consumption with illegal drugs of abuse, and 34 (10%) with some medication. Thiamine was administered in 98 cases (28.7%). In 78 of these cases (79.6%) the indication was correct, and in 20 (18.9%) it was not ($P = .007$).

Patients who received thiamine were older [42.9 (13.6) vs 34.1 (15.3) years; $P < .001$], predominantly male (36.6% vs 15.2%; $P < .001$), and had a Glasgow Coma Scale score < 9 (52.9% vs 26.8%; $P = .027$).

Tables 1 and 2 illustrate the characteristics of patients according to thiamine administration. Those treated with thiamine had psychiatric history (29.6% vs 18.5%; $P = .025$) and previous intoxications (79.6% vs 44%; $P < .001$) more frequently, and a decreased level of consciousness or agitation more often than patients who did not receive it (35.9% vs 20.4%; $P = .002$).

The use of cocaine and cannabis was associated with thiamine administration, although not reaching statistical significance ($P = .072$ and $P = .061$, respectively). The need for treatment (26.1% vs 23.2%; $P = .09$), particularly the use of flumazenil (57.1% vs 27.5%; $P = .016$), was associated with greater use of thiamine.

Discussion

Thiamine, or vitamin B1, is indicated for preventing Wernicke's encephalopathy in chronic alcoholism. As previously mentioned, its use is not indicated in the management of acute alcohol intoxication.[6-8] However, some authors argue that in moderate-to-severe cases, acute alcohol intoxications may be treated with IV fluids, dextrose, thiamine, and folic acid.[9] Although it is unlikely to harm the patient—since adverse effects are rare[10]—we believe its generalized use should be avoided.

The results of this study show that thiamine administration in patients treated for acute alcohol intoxication in a teaching hospital is consistent with current recommendations. In fact, in nearly 80% of cases, it was administered correctly.

Patients who received vitamin B_1 were older, predominantly male, and had more previous intoxications and psychiatric history. Furthermore, their level of consciousness as assessed by the Glasgow Coma Scale was more decreased. However, thiamine use was not associated with agitation or concomitant ingestion of illegal drugs or medications. These findings may be partly explained by the fact

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Table 1. Characteristics of patients with acute alcohol intoxication according to thiamine administration

	Thiamine administration N = 98 n (%)	No thiamine administration N = 243 n (%)	*P*
Age, years [mean (SD)]	42.9 (34.1)	34.1 (15.3)	< .001
Sex			< .001
Men	79 (80.6)	137 (56.4)	
Women	19 (19.4)	106 (43.6)	
Origin			ns
Native	45 (45.9)	104 (42.8)	
Non-native	53 (54.1)	139 (52.2)	
Tourist			ns
Yes	4 (4.1)	18 (7.4)	
No	94 (95.9)	225 (92.6)	
Initiative			ns
Own means	9 (9.2)	43 (17.7)	
EMS	83 (84.7)	178 (73.3)	
Other	6 (6.1)	22 (9)	
Intent			ns
Recreational	96 (98)	230 (94.6)	
Suicidal	2 (2)	13 (5.4)	
Location			ns
Home	21 (21.4)	53 (21.8)	
Public place	77 (78.6)	190 (78.2)	
Previous intoxications	78 (79.6)	107 (44)	< .001
Psychiatric history	29 (29.6)	45 (18.5)	.025
Concomitant use of illegal drugs	24 (24.5)	57 (23.5)	ns
Concomitant medication intake	12 (12.2)	22 (9)	ns

EMS: Emergency Medical Service.

Table 2. Clinical findings and treatment of patients with acute alcohol intoxication according to thiamine administration

	Thiamine administration N = 98 n (%)	No thiamine administration N = 243 n (%)	*P*
Presence of decreased consciousness or agitation			.002
Yes			
No			
Glasgow Coma Scale < 9			.027
Yes	9 (9.2)	8 (3.3)	
No	89 (90.8)	235 (96.7)	
Agitation			ns
Yes	13 (13.3)	34 (14)	
No	85 (86.7)	209 (86)	
Any type of treatment			ns
Yes	53 (54.1)	94 (38.7)	
No	45 (45.9)	149 (61.3)	
Use of any antidote			ns
Yes	9 (9.2)	10 (4.1)	
No	89 (90.8)	233 (95.9)	
Flumazenil			.016
Yes	8 (8.2)	6 (2.5)	
No	90 (91.8)	237 (97.5)	
Naloxone			ns
Yes	7 (7.1)	7 (2.9)	
No	91 (92.9)	236 (97.1)	

that patients with chronic alcoholism—those with more frequent previous intoxications and likely psychiatric history[11]—are also older. The predominance of men in this study is consistent with the fact that most alcohol intoxications occur in men,[12] so a higher proportion of male patients among chronic alcohol users is expected.

Another issue is the use of thiamine in patients with decreased level of consciousness, in whom effects of concomitant illegal drug use may coexist. It is likely that clinicians managing such patients are influenced by the severity of the situation, leading them to administer more drugs vs patients who maintain normal consciousness. This scenario may also explain the greater use of thiamine in patients receiving flumazenil. In contrast, in agitated patients with possible illegal drug use, sedation is often prioritized, and thiamine administration might be less frequently considered.

This study has several limitations. First, it is a single-center and retrospective study, so the results cannot be generalized. Second, nutritional status and chronic alcoholism assessment relied on health record data, which may have caused misclassification in some cases. Nonetheless, it is reasonable to assume chronic alcoholism based on daily alcohol consumption criteria.[13] Finally, blood ethanol levels were not measured, although this is not routine or necessary in emergency care unless for judicial purposes or in cases of unknown or mixed coma.[14] To our knowledge, this is the first study evaluating thiamine use in acute alcohol intoxication, and we believe the number of patients included lends validity to the results.

Thiamine is administered in approximately one quarter of acute alcohol intoxications treated in the ED and, in most cases, it is used appropriately. Decreased level of consciousness, psychiatric history, and previous intoxications are associated with its use.

ARTICLE INFORMATION

Conflict of Interest Disclosures: None reported.

Funding: The authors declare the non-existence of funding in relation to this article.

Ethical Responsibilities: The authors have confirmed the maintenance of confidentiality and respect for the patient rights, agreement of publication, and transfer of rights to Revista Española de Urgencias y Emergencias.

Article not commissioned by the Editorial Board and with external peer review.

Note of the editors: This is a BOWMAN-generated English translation of the officially indexed Spanish-language article, which should be cited as Rev Esp Urg Emerg. 2023;2:147-150. In this translated version, the editors have supervised the process; however, it cannot be ruled out that some errors resulting from the artificial intelligence translation process may have gone unnoticed.

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