Ascorbic acid deficiency and cognitive impairment in alcohol cessation inpatients

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INTRODUCTION

High prevalence of malnutrition is observed in patients with alcohol use disorder (AUD). However, the specific risks of scurvy and ascorbic acid deficiency (AAD) in AUD patients need to be clarified in order to better target biological screening and supplementation treatments.

Ascorbic acid (AA) has been shown to have a protective role against the excitotoxicity of glutamate (1-3). Malnutrition has been reported as having a possible influence on acute alcohol-related cognitive impairment (4). Though, the association between AAD and cognitive impairment has not been studied in patients with AUD.

AIMS

1) Describe the prevalence of ascorbic acid deficiency (AAD) and insufficiency (AAI) in inpatients admitted for alcohol cessation.
2) Identify the risk factors or markers associated with AAD and AAI
3) Analyse the association between ascorbic acid level and acute cognitive impairment in the immediate follow-up to alcohol withdrawal, as measured by the Montreal Cognitive Assessment (MoCA).

MATERIALS AND METHODS

Population

Consecutive inpatients admitted for medically monitored alcohol detoxification, not hospitalised in the previous three months , without decompensated cirrhosis, neoplasia or sepsis.

Methods

- Ascorbic acid (AA) was sampled in the morning, after fasting and the first day after admission. AA was measured by a fully validated UV high-performance liquid chromatography method.
- AA deficiency was defined as <2mg/L (scurvy threshold), insufficiency as 2-4.99mg/L and normal level as ≥5.0mg/L.
- The cognitive assessment was carried out between days 10 and 13 of hospitalization with the French version of MoCA, after alcohol withdrawal was completed.

RESULTS

AA deficiency = 28.1% (27)
AA insufficiency = 22.9% (22)

Caracteristics of subjects

- 96 patients
- 74 men and 22 women
- 24 – 79 years
- Mean age 49.1 years [SD ±11.5]
- mean of alcohol intake per day was 225g [±130].
- 73 (79.2%) current smokers and 12 (12.5%) former smokers.
- 17 (17.7%) street homelessness and 16 (16.7%) sheltered homelessness.
- 8 were asymptomatic people living with HIV
- MoCA was available for 53 patients

Figure: MoCA score as a function of ascorbic acid (AA) level (n=53) *AA is presented in logarithmic range*
β of AA natural logarithm = 1.91, p=5.3x10^{-4}

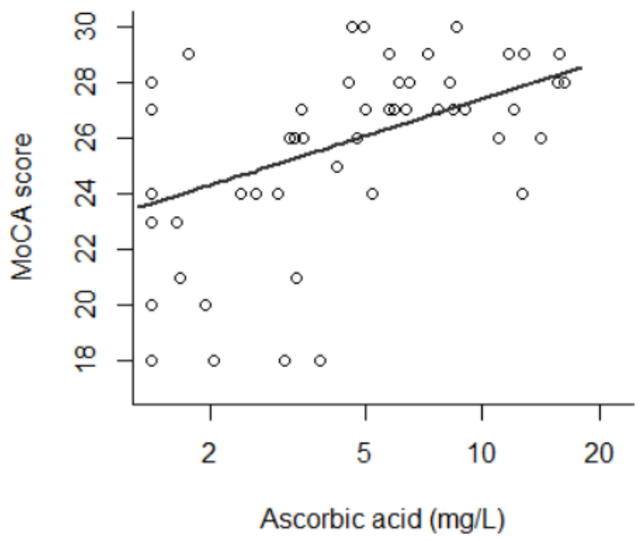

Table 1: Factors associated with ascorbic acid categories (n = 96)

		Univariate analysis Ascorbic Acid Level (mg/L)				Multivariate analysis of AAD versus normal level	
		Deficiency (< 2.0)	Insufficiency (2.0–4.99)	Normal level (≥ 5.0)	*p-value*	OR $^{\mu}$	95%CI
Sex	Women	1 (4.5%)	5 (22.7%)	16 (72.7%)	0.011 $^{£}$	ref	ref
	Men	26 (35.1%)	17 (23.0%)	31 (41.9%)		17.8	1.63-194
Housing	Private home	13 (20.6%)	12 (19.0%)	38 (60.3%)	0.014 $^{\$}$	ref	ref
	Homeless in a shelter	5 (31.2%)	5 (31.2%)	6 (37.5%)		2.37	0.56-10.1
	Street homelessness	9 (52.9%)	5 (29.4%)	3 (17.6%)		5.76	1.24-26.8
Cirrhosis	Compensated	8 (61.5%)	1 (7.7%)	4 (30.8%)	0.028 $^{\$}$	9.35	1.60-54.6
	No cirrhosis	19 (22.9%)	21 (25.3%)	43 (51.8%)		ref	ref

$^{£}$ *Chi-square test* $^{\$}$ *Fisher test* μ Multinomial regression

Table 2: Multivariate analysis of factors associated with MoCA Score at days 10–13
(n=47; *Polynomial regression* R^2=0.60, p=4.7x 10^{-4})

		β	p-value
Ascorbic acid	natural logarithm (mg/L)	1.18	0.037
Sedative use disorder	Yes	-2.77	0.046
	No	ref	
Sex	Women	ref	0.54
	Men	-0.53	
Age (years)	/ decade	-4.1	0.099
	/ decade^2	0.31	0.19
Prealbumin (g/L)		2.50	0.51
Housing	Private home	ref	ref
	Homeless in a shelter	1.29	0.19
	Street homelessness	-2.01	0.17
Socioprofessional category *	Higher	ref	ref
	Intermediate	1.23	0.29
	Lower	-1.69	0.053
HIV status	Yes	-2.67	0.075
	No		
Cannabis use disorder	Yes	0.72	0.50
	No	ref	

** Socioprofessional category according to INSEE classification*

CONCLUSION

Ascorbic acid deficiency is frequent in inpatients admitted for alcohol detoxification and mainly in men, socially precarious patients and those with compensated cirrhosis. Ascorbic acid deficiency was associated with acute cognitive impairment in the immediate follow-up to alcohol withdrawal. Universal supplementation in AA should be tested during alcohol withdrawal.

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