

Cognitive impairment produced by alcohol chronic consumption in alcohol dependent patients



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Conflict of interests

- ▣ The authors declare no conflicts of interest in relation to this study.
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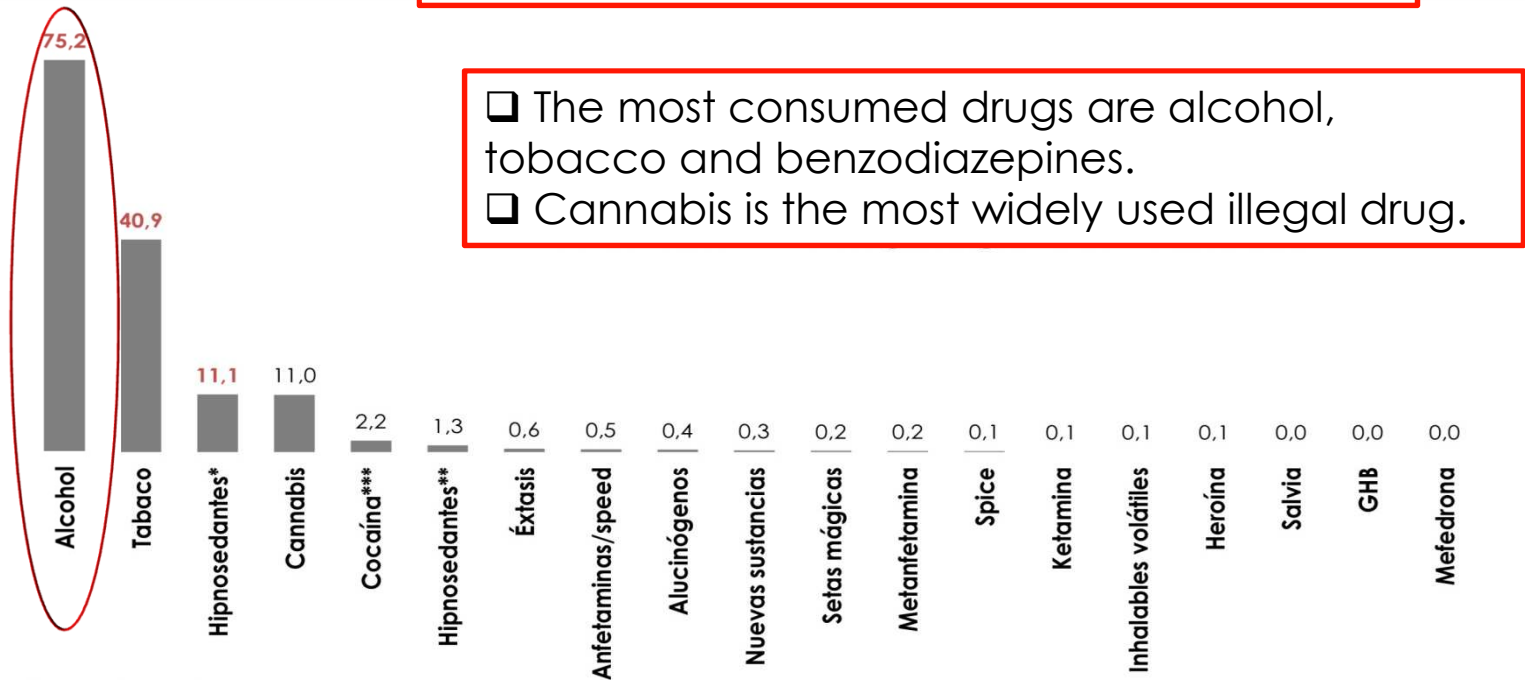
INTRODUCTION

Magnitude of the problem



Consumption of drugs

Prevalence of consumption (%)
Last 12 months. Population 15-64 years.



- ☐ The most consumed drugs are alcohol, tobacco and benzodiazepines.
- ☐ Cannabis is the most widely used illegal drug.

* con o sin receta
** sin receta
*** polvo y/o base

Slide 4

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Magnitude of the problem

- ▣ Alcohol dependence is characterized by the loss of control regarding alcohol consumption ¹.
- ▣ This dependence is related to alterations in the function of brain structures that regulate motivation, learning, memory, attention capacity and executive function¹.
- ▣ Insufficient cognitive ability or executive function would also facilitate loss of control ².
- ▣ Most acute effects inhibit executive function, while chronic ones include, the damage of the prefrontal structures that control executive function².

¹ koob & Volkow, 2010; Volkow et al, 2016; ² Bates, Bowden et al, 2002; Stavro et al, 2013; Wilcox et al, 2014.

NPD Project

Evaluation of the executive function as a prognostic factor in patients with alcohol dependence who begin outpatient treatment.

Código proyecto: **2016I070**



PI: Gerardo Flórez Menéndez

Objectives

General objective:

- ▣ To assess whether changes in cognitive control and executive function are a useful predictor regarding alcohol consumption

Specific objectives:

To determine whether the alterations in cognitive control and executive function are related with:

- ▣ Age of alcohol dependence onset
- ▣ Presence of alcohol related obsessive compulsive symptoms (OCDS)
- ▣ Impulsivity of the patients (BIS-11)
- ▣ Presence of excessive alcohol consumption biomarkers

MATERIAL AND METHODS

Participants and methods: Design

- ▣ The design is **transversal** and **follow-up** with a **case-control** comparison. (long term follow-up in the case group).

INCLUSION CRITERIA (>18 years)

- Agreeing to participate in the study and signing the corresponding informed consent.
- No personal history of major depression and/or attempted suicide/completed suicide
- No organic pathology that prevents participation

Patient group:

- Meeting DSM-5 criteria for moderate or severe alcohol use disorder

Control group:

- Alcohol consumption over the last month < 30 grams of ethanol per day

EXCLUSION CRITERIA (< 18 years)

- Presenting organic or psychiatric pathology which would impede participation (including substance use disorders with the exception of alcohol in the patient group and smoking for both groups)
- Not meeting inclusion criteria
- Not signing the informed consent.

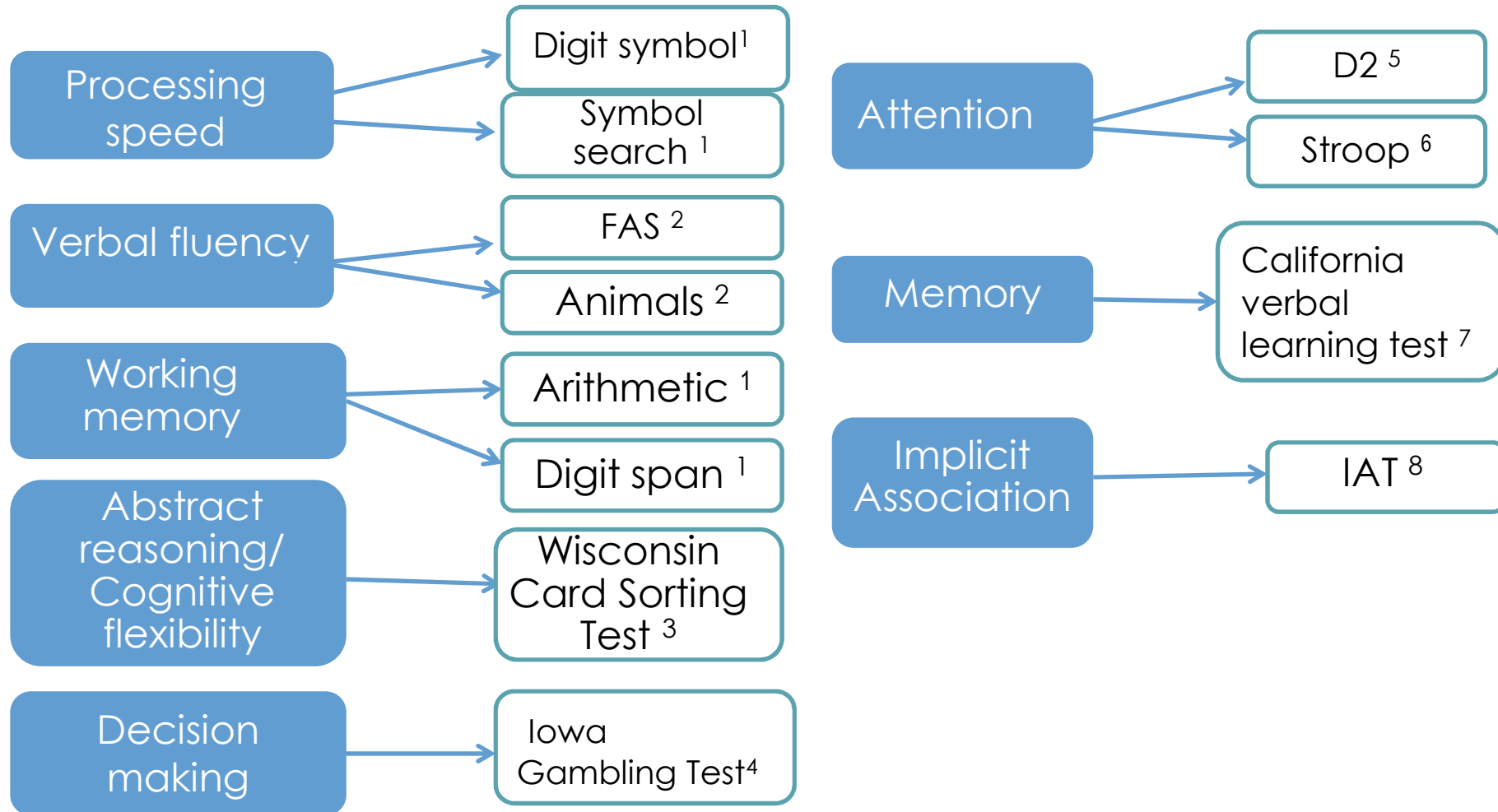
Approved by the Ethics and Research Committee of Pontevedra, Vigo, Ourense (2016-313) and of Principado de Asturias (2017-06).

Participants and methods

- ▣ Ad-hoc questionnaire. Sociodemographic and substance use variables.
- ▣ Determination of analytical variables linked to alcohol use. GOT, GPT, GGT and VMC.
- ▣ Clinical variables. Questionnaires
 - ▣ Hamilton Depression Rating Scale-17 (HDRS-17) ¹
 - ▣ Obsessive Compulsive Drinking Scale (OCDS) ²
 - ▣ Obsessive, compulsive and total subscales.
 - ▣ Barrat Impulsiveness Scale-11 (BIS-11) ³
 - ▣ Cognitive, motor, non-planning and total subscales.

¹ Bech, 1990; ² Anton et al., 2000; ³ Patton et al., 1995.

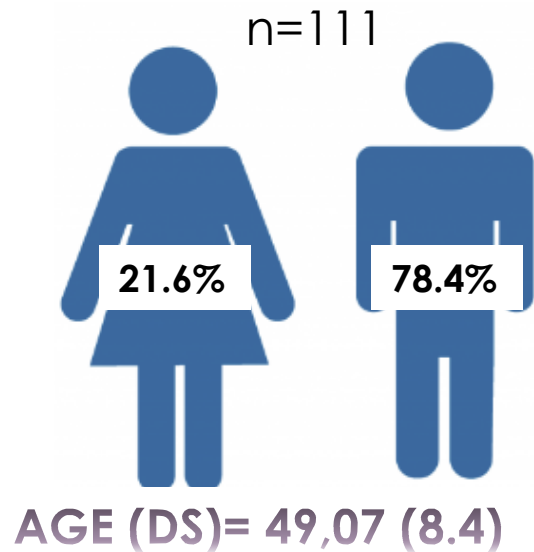
Cognitive Domains



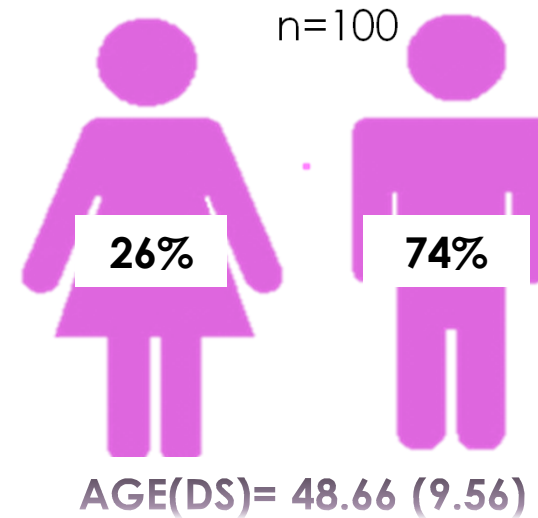
¹ Wechsler, 1997; ² Benton & Hamser, 1976; ³ Heaton et al, 1981; ⁴ Bechara et al, 1994; ⁵ Brickenkamp & Zillmer, 2002; ⁶ Goleen et al, 1995; ⁷ Delis et al, 1987; ⁸ Ostafin et al, 2008.

RESULTS AND DISCUSSION

Sample description



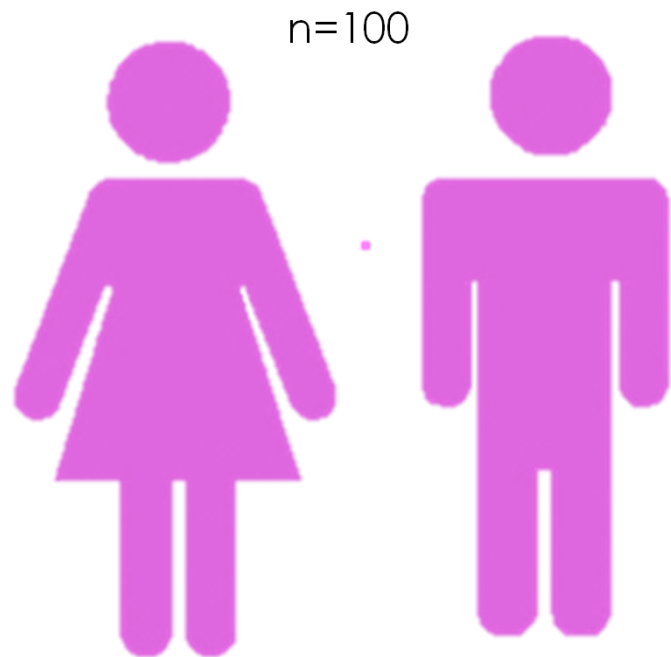
Patients



Controls

No significant differences between both groups respect to age, sex and completed years of schooling

Sociodemographic description

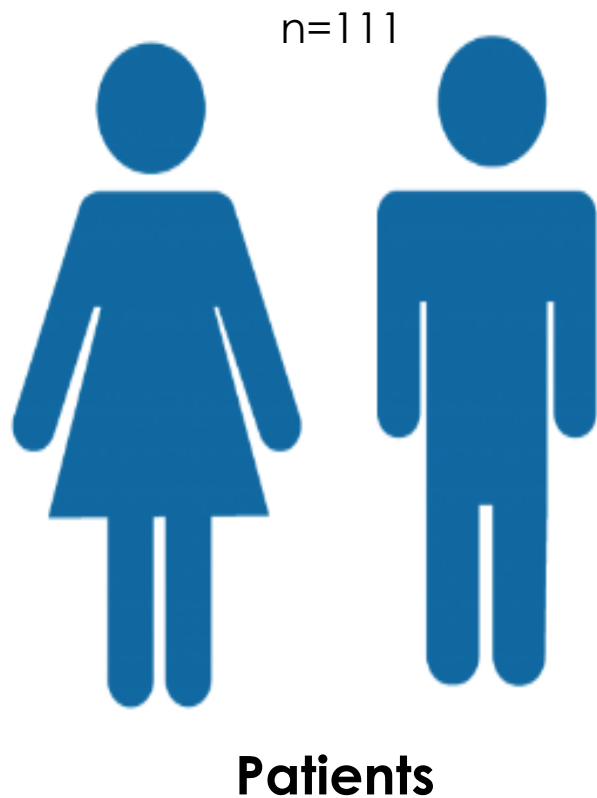


Controls

Greater frequency:

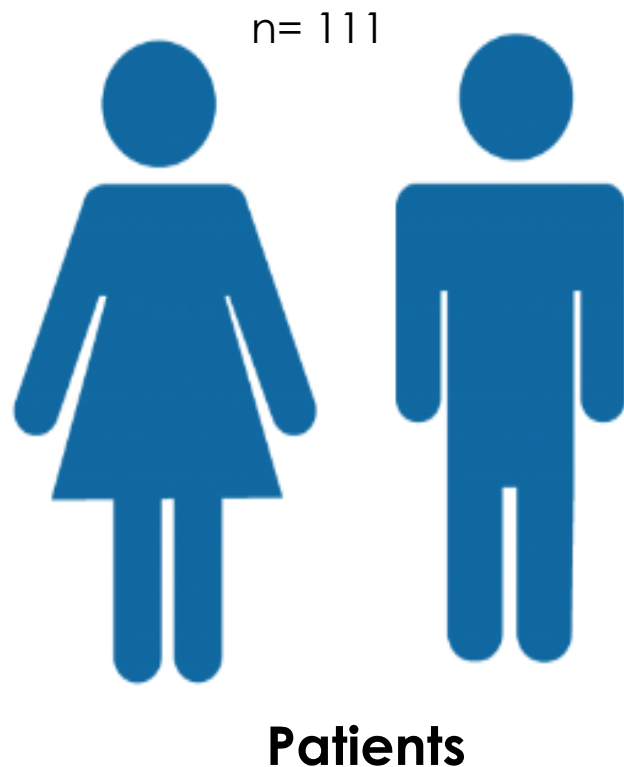
- Have a partner
 $X^2= 4.48, p= 0.035$
- Live with a relative
 $X^2= 12.385, p= 0.002$
- Active employment
 $X^2= 36.828, p< 0.001$

Clinical description



- Earlier smoking onset age
T= 3.96 p< 0.001
- Greater daily consumption of cigarettes
T= -5.1, p< 0.001
- Greater daily alcohol consumption
T= -14.18, p< 0.001
- Higher number of family members affected by alcohol use
T= -4.73, p< 0.001

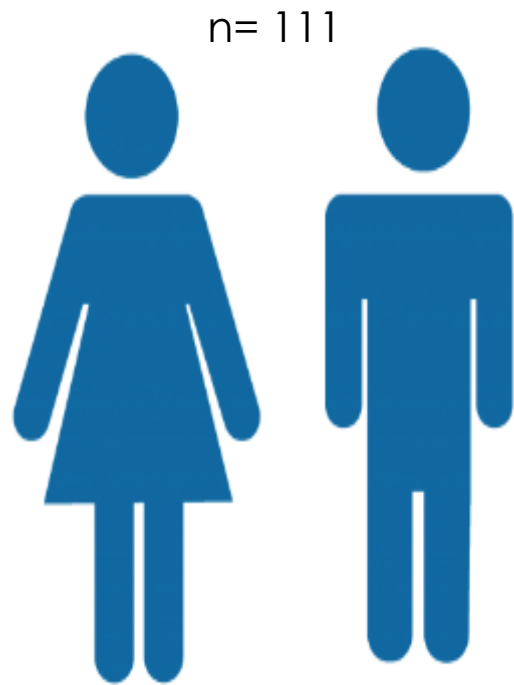
Clinical description



Analytical variables linked to alcohol use:

- GOT (DS) = 38.53 (25.44)
- GPT (DS) = 37.02 (20.37)
- GGT (DS) = 130.4 (167.5)
- CVM (DS) = 95 (6.36)

Clinical description



Patients

Greater impulsivity



- BIS-11 cognitive
T= -3.6, $p < 0.001$
- BIS-11 motor
T= -3.02, $p = 0.003$
- BIS-11 non-planning
T= -3.35, $p = 0.001$
- BIS-11 total
T= -4.04, $p < 0.001$

Higher scores for pathological alcohol use

- OCDS obsessive
T= -14.18, $p < 0.001$
- OCDS compulsive
T= -22.95, $p < 0.001$
- OCDS total
T= -21.23, $p < 0.001$





Cognitive evaluation

■ Processing speed: Digit symbol (DS)

DS	Patients (DS)	Controls (DS)	T	P	
Correct	46,4 (15,8)	63,10 (19,10)	6.89	< 0.001	
Estandard score	7,34 (2,86)	10,26 (3,26)	5.99	< 0.001	




Cognitive evaluation

Processing speed: Symbol search (SS)

SS	Patients (DS)	Controls (DS)	T	P	
Correct	23,95 (7,45)	30,78 (8,33)	6.25	<0.001	
Error	1,54 (1,88)	0,95 (1,30)	-2.68	0.008	
Raw score	22,00 (7,69)	29,57 (9,31)	6.4	<0.001	
Standard score	8,10 (2,83)	10,46 (3,12)	5.74	<0.001	



Cognitive evaluation

▣ Verbal fluency: FAS and semantic category of animals

FAS/ animals	Patients (DS)	Controls (DS)	T	P	
FAS correct	27,3 (11,3)	36,5 (11,7)	5.84	< 0.001	
FAS perseveration errors	0,81 (1,28)	0,78 (1,53)		0.893	
FAS intrusion errors	0,64 (1,03)	0,23 (0,63)	-3.51	< 0.001	
FAS Derivation errors	0,58 (0,95)	0,48 (1,14)		0.507	
Animals	17,14 (4,77)	21,56 (6,23)	5.74	< 0.001	





Cognitive evaluation

▣ Working memory: Arithmetics (A)

Arithmetics	Patients (DS)	Controles (DS)	T	P	
Raw score	11,32 (3,21)	13,79 (3,93)	4.96	< 0.001	
Standard score	8,43 (3,06)	10,70 (3,53)	4.96	< 0.001	

Cognitive evaluation

▣ Working memory: Digits span (D)

Digits	Patients (DS)	Controls (DS)	T	P	
Direct	8,11 (2,21)	9,33 (2,10)	4.11	< 0.001	
Reverse	6,71 (2,01)	8,07 (2,18)	4.69	< 0.001	
Cumulative	6,64 (2,27)	8,19 (2,33)	4.89	< 0.001	
Total	21,42 (5,57)	25,54 (5,39)	5.45	< 0.001	

Cognitive evaluation




Decision making: Iowa Gambling Test (IGT)

IGT	Patients (DS)	Controls (DS)	P	
Total	1836 (822)	2039 (964)	0.104	
NET 5 AD	9,72 (4,60)	10,56 (4,85)	0.2	
NET 5 DIS	10,28 (4,60)	9,44 (4,85)	0.2	




Cognitive evaluation

■ Abstract reasoning/Cognitive flexibility: Wisconsin Card Sorting Test (WCST)

WCST	Patients (DS)	Controls (DS)	T	P	
Completed categories	3,08 (2,04)	4,59 (1,98)	5.44	< 0.001	
Correct	67,2 (13,4)	70,7 (11,3)	2.05	0,042	
Errors	54,0 (21,0)	36,1 (23,3)	4.84	< 0.001	







Cognitive evaluation

▣ Attention test D2

D2	Patients (DS)	Controls (DS)	T	P	
Number of characters	113.0 (44.5)	163.7 (43.2)	8.4	< 0.001	

Cognitive evaluation








■ Attention: Stroop Test (SWCT)

SWCT	Patients (DS)	Controls (DS)	T	P	
Prop correct	0,89 (0,12)	0,95 (0,07)	4.6	< 0.001	
Mean RTCC	2654 (1610)	1972 (1288)	-3.41	< 0.001	
Mean RTCI	3033 (2635)	1874 (1170)	-4.19	< 0.001	
Mean RTCCO	3179 (2958)	2349 (1921)	-2.44	0.016	
PROPCI	0,85 (0,26)	0,99 (0,09)	-5.03	< 0.001	
Mean RT	1181 (1633)	49 (351)	-7.12	< 0001	

Prop correct: Proporción de respuestas totales correctas; mean RTCC: Latencia media de respuesta correctas congruentes; mean RTCI: Latencia media de respuestas correctas incongruentes; mean RTCCO: Latencia media de respuestas correctas; PROPCI: Proporción de respuestas correctas incongruentes; mean RT: Latencia media de respuestas totales correctas

Cognitive evaluation

■ Memory: California Verbal Learning Test (CVLT)

CVLT	Patients (DS)	Controls (DS)	T	P	
A1	5.77 (1.2)	6.91 (2.75)	3.47	0.001	
A5	11.26 (2.93)	13.38 (2.51)	5.65	< 0.001	
AToT	45.8 (11.6)	53.2 (9.80)	5.05	< 0.001	
Free immediate	9.77 (3.32)	12.31 (2.82)	6	< 0.001	
Free delayed	10.32 (3.35)	12.98 (2.9)	6.19	< 0.001	
Guided	11.42 (2.38)	13.64 (2.7)	5.83	< 0.001	
Recognition	14.2 (2.12)	15.34 (1.08)	5.01	< 0.001	

Cognitive evaluation

▣ Implicit Association Test (IAT)

IAT	Patients (DS)	Controls (DS)	P	
IAT	-0,48 (0,48)	-0,57 (0,52)	0.215	



Cognitive evaluation

Processing speed

Verbal fluency

Working memory

Flexibility

Decision making

Attention

Verbal learning

Implicit Association

	DS	SS	FAS	Animals	A	D	WCST	IGT	D2	SWCT	CVLT	IAT
SDUs					↓							
GOT												
GPT										↓		
GGT												
VCM					↓							

DS= Digit symbol; SS= Symbol search; A= Arithmetics; D= Digits; WCST= Wisconsin card sorting test; IGT= Iowa gambling test; D2= Attention test D2; SWCT= Stroop test; CVLT= California verbal learning test; IAT= Implicit association test.

Cognitive evaluation

	Processing speed	Verbal fluency	Working memory	Flexibility	Decision making	Attention	Verbal learning	Implicit Association				
	DS	SS	FAS	Animals	A	D	WCST	IGT	D2	SWCT	CVLT	IAT
Years alcohol dependence		↓			↓	↓	↓		↓		↓	
% lifespan dependence		↓					↓				↓	↓

DS= Digit symbol; SS= Symbol search; A= Arithmetics; D= Digits; WCST= Wisconsin card sorting test; IGT= Iowa gambling test; D2= Attention test D2; SWCT= Stroop test; CVLT= California verbal learning test; IAT= Implicit association test.

Cognitive evaluation

	Processing speed		Verbal fluency		Working memory		Flexibility	Decision making	Attention	Verbal learning	Implicit Association	
	DS	SS	FAS	Animals	A	D	WCST	IGT	D2	SWCT	CVLT	IAT
OCDS obsessive				↓			↓					
OCDS compulsive		↓					↓					
OCDS total		↓					↓	↓				↓

DS= Digit symbol; SS= Symbol search; A= Arithmetics; D= Digits; WCST= Wisconsin card sorting test; IGT= Iowa gambling test; D2= Attention test D2; SWCT= Stroop test; CVLT= California verbal learning test; IAT= Implicit association test.

Cognitive evaluation

Processing speed

Verbal fluency

Working memory

Flexibility

Decision making

Attention

Verbal learning

Implicit Association

	DS	SS	FAS	Animals	A	D	WCST	IGT	D2	SWCT	CVLT	IAT
BIS cognitive			↓			↓	↓			↓	↓	
BIS motor						↓	↓			↓		↓
BIS non planning						↓	↓			↓		↓
BIS total			↓			↓	↓			↓		↓

Conclusions

- ▣ Patients with alcohol use disorder have worse planning capacity and less cognitive flexibility, added to which are attentional and anterograde memory impairments.
 - ▣ These disorders would pose serious problems for the patients when following a program of planned alcohol cessation and these cognitive impairments would favor relapses in alcohol use.
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“Vente, vente a Oviedo en 2020”



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