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Relationship between craving and impulsivity in patients with alcohol dependence with or without dual disorders in an outpatient treatment center: a descriptive study

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Objectives. To compare alcohol and other drugs abuse, state impulsivity, craving and the relationship between craving and impulsivity in alcohol-dependent patients with or without dual disorder attending to an alcohol treatment center in Cadiz town.

Method. An observational, descriptive and transversal study performed on 112 alcohol dependent patient sample who were seeking treatment in ARCA outpatient treatment center in Cadiz. The sample was divided in two groups, according to present dual diagnosis or not. The sample was assessed with an AdHoc sociodemographic and clinical questionnaire and specific scales and interviews that included: 5.0 Mini International Neuropsychiatric Interview results (MINI), State Impulsivity Scale (SIS), and Multidimensional Alcohol Craving Scale (MACS).

Results. The prevalence of dual diagnosis was 50%, being the most prevalent disorders: *Current* and *recurrent Major Depressive Episode Mood Disorder*, *Current Dysthymic Mood Disorder*, *Panic Disorder* and *Anxiety Disorder*. 52,7% of the total sample had a positive result on the State Impulsivity Scale. No statistically significant results were found on the Craving Scale (neither in the score or in the sub-sections). A relationship between craving and impulsivity were found for all groups and researched items.

Conclusions. As a relationship between craving and impulsivity was observed, these aspects should be considered as main factors for the treatment and evolution of alcohol-dependent patients.

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Relación entre craving e impulsividad en pacientes con dependencia alcohólica con o sin patología dual en tratamiento ambulatorio: un estudio descriptivo

Introducción. Comparar el consumo de alcohol y otras drogas, la impulsividad estado, el *craving* y la relación entre estos últimos en pacientes con dependencia alcohólica con o sin patología dual que acuden a un centro de tratamiento específico de alcoholismo en la ciudad de Cádiz.

Metodología. Estudio observacional, descriptivo y transversal de una muestra de 112 pacientes con dependencia alcohólica que acuden para solicitar tratamiento al Centro de Tratamiento Ambulatorio ARCA, de Cádiz. Se divide a los pacientes en dos grupos, según padezcan o no patología dual, mediante la entrevista MINI 5.0. Se evalúa la impulsividad mediante la Escala de Impulsividad de Estado (EIE) y el *craving* mediante la Escala Multidimensional de Craving de Alcohol (EMCA) y se rellena un cuestionario de información adicional que recoge datos sociobiográficos, educativos, económicos y relativos al consumo de alcohol y otras drogas.

Resultados. La prevalencia de patología dual es del 50%, las patologías más prevalentes son: *Episodio Depresivo Mayor actual* y *recurrente*, *Trastorno Distímico actual*, *Trastorno de Angustia* y *Trastorno de Ansiedad*. El 52,7% de la muestra global presenta un resultado positivo en la escala EIE. No existen diferencias de puntuación significativas, tanto en la valoración global como en los subapartados de la escala de *craving*. Existe una asociación entre el *craving* y la impulsividad en todos los subgrupos de población y en todas las categorías.

Conclusiones. Existe una relación entre *craving* e impulsividad, lo que debe ser tenido en cuenta en el momento de planificar el tratamiento y diseñar estrategias de prevención de recaídas.

Palabras clave: *Craving*, Impulsividad, Patología Dual, Dependencia Alcohólica, Alcohol

INTRODUCTION

The prevalence in Europe of alcohol dependence in 2013 was estimated at 5.4% in men and 1.5% in women[1]. The disorders more frequently related to alcohol dependence are anxiety and mood disorders[2]. The coexistence of an addictive disorder and another mental disorder at the same time is defined as Dual Diagnosis (DD)[2,3], and its prevalence ranges between 15-70%[4-10].

The clinical course of an addiction, its intensity and prognosis may be mediated by several factors, being impulsivity and craving some of the most relevant[11]. These two factors are associated with higher relapse rates and worse prognosis in patients with a substance use disorder; however, this association has been scarcely studied in alcohol use disorder[11]. The relationship between impulsivity and alcohol consumption has been established in longitudinal and cross-sectional studies[12] and has been considered as a risk factor for harmful alcohol consumption[13].

Craving is one of the key symptoms in addictive behaviors since its intensity is related to the evolution and prognosis of the patient[14,15]. Craving is a psychobiological phenomenon influenced by cognitive, behavioral, emotional, motivational, and personality factors[16]. Its specific definition is framed as a subjective experience of intense desire to consume, or imperatives need to self-administer a particular addictive substance[17]. In the last decades, it has acquired a great relevance, reason why it has been included in the DSM-5 like "craving or intense desire to use substances"[18].

It has been described that negative moods and stress reactions may increase craving (Maude-Griffin & Tiffany, 1996), and furthermore, DD patients refer lower craving[14,16]. The above could indicate a lack or difficulty of insight or recognition of craving in these patients.

On the other hand, impulsivity is defined as a tendency to respond quickly, unplanned and without regard to the consequences of that behavior[20]. This tendency to respond impulsively may be part of a stable trait of personality[21] or be a transient state derived for example from substance use, psychiatric disorders, medical illness or drug treatments[22]. State impulsivity encompasses transient variations in levels of impulsivity that are dependent on environmental or biological changes[23]. Patients with alcohol use disorder have higher scores on impulsivity than alcohol drinkers without alcohol use disorders[24] and non-drinkers[25,26].

This study aims to describe craving and state impulsivity, and evaluate the relationship between craving and impulsivity in alcohol-dependent patients with or without DD attending to an alcohol outpatient treatment center. The main hypothesis is that there is a relationship between craving and impulsivity.

METHODS

Participants

A cross-sectional descriptive study was carried out evaluating craving and impulsivity (and their interrelation) in a sample of 136 patients who attended an outpatient treatment center for alcohol dependence in Cadiz-Spain. A non-probability sampling was performed (convenience sampling). From the total sample, 136 patients accepted to participate, but the final sample was composed by only 124 patients due to 12 patients were discarded for inadequate compliance with the questionnaires (see figure 1).

Procedures

The sample recruitment period was between January and December 2014, all patients who met criteria were invited to participate. Inclusion criteria were: Diagnosis of alcohol dependence according to the DSM-IV-TR diagnostic criteria[27], age over 18 years old, initiation of voluntary treatment, desire to achieve alcohol abstinence, culmination of the assessment process and sign the informed consent. Exclusion criteria were: no culmination of assessment process and active alcohol consumption without desire to achieve abstinence.

A DD screening (limited to the axis I) was performed through the semi-structured MINI-5 interview, in this way two groups were obtained: non-DD patients (individuals with alcohol dependence without another associated psychiatric disorder of the axis I), and DD patients (individuals with alcohol dependence and other psychiatric disorders of the axis I, excluding substance abuse or dependence other than alcohol).

Measures and Instruments

Sociodemographic and consumption data were obtained through clinical interview. The structured diagnostic

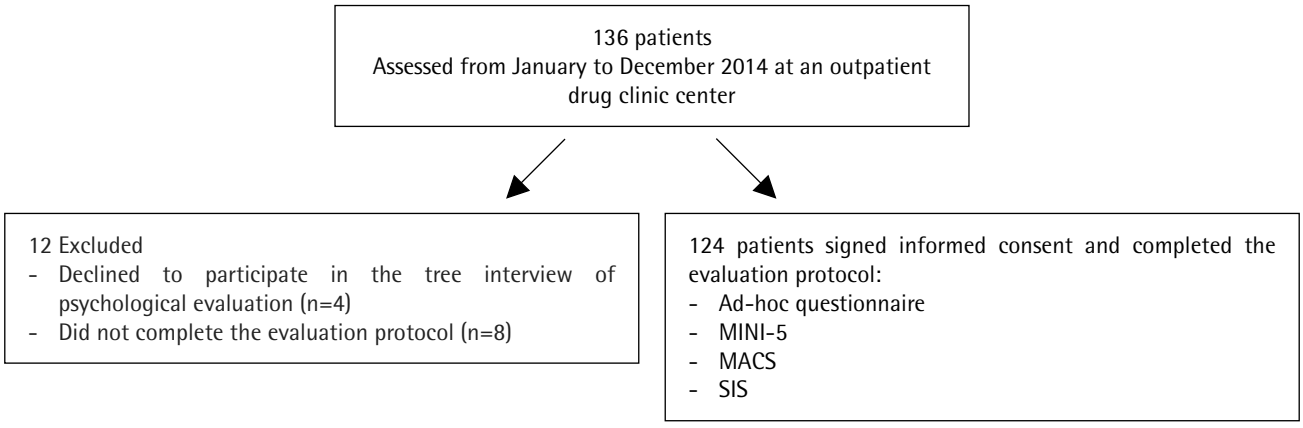

Figure 1 | *Patient flow*

interview MINI-5[28] that explores the main disorders of the I axis (according to the DSM-IV) was used in order to obtain diagnoses of the axis I[28].

Assessment of craving was performed with The Multidimensional Alcohol Craving Scale (MACS) in its version in Spanish[16]. This scale has 12 items that are scored from1 to 5, and thus, it classifies craving in mild (<16), moderate (16-40) and intense (>40). The total craving score is the sum of the *Desire to Drink* and the *Behavioral Disinhibition*.

State impulsivity was assessed with the State Impulsivity Scale (SIS) in its validation in Spanish in general population[23]. This scale describes state impulsivity based on a three-concept model: *Reward, Automatism and Attentional*. SIS consists in a 20 items scale, wherein the higher score, the higher impulsivity. Finally, total score was classified as significant (>17 in men and >14 in women) or non-significant. The remaining sections will be collected according to numerical score.

Statistical analysis

A descriptive analysis was performed for the quantitative variables by calculation of means and standard deviations, while for qualitative variables were calculated relative and absolute frequencies. Qualitative variables were compared using chi-squared test or Fisher's exact test, and with Student's t-test/ ANOVA (or its non-parametric equivalents, Mann Whitney U test and Kruskal–Wallis test) for quantitative variables. Correlations between quantitative variables were performed with Pearson correlation coefficient and Spearman's rank correlation coefficient. SPSS version 21 was used for statistical analyses.

RESULTS

From 112 patients (75.8% males) that composed the final sample, 56 participants belonged to non-DD patient group (78.6% males), while 56 were from DD patient group (73.2% males). 95.5% were Spanish and 4.5% were from outside Europe Union. No differences were found in sociodemographic variables between groups or sex (Table 1).

The mean alcohol intake at baseline was 88.18 standard drink per week (87.93 in non-DD patients vs. 88.43 in DD patients). The mean age of drinking onset was 17.48 years (16.72 in men vs. 19.89 in women).

According to MINI-5, 50% of the sample had DD. Among the most prevalent disorders were found: current major depressive episode (MDE) (40.2%), recurrent major depressive disorder (MDD) (19.6%), dysthymic disorder (11.6%), generalized anxiety disorder (GAD) (9.85), and panic disorder (8.95). Regarding sex differences in diagnoses, in the global sample, males have a higher prevalence of MDD, while women had higher presence of anorexia nervosa. In the subgroup of DD patients, women presented higher prevalence of current MDE with melancholic features than men (Table 2).

Regarding craving, almost three-quarters of the sample had a moderate or intense global score. Most men in the global sample had moderate and severe scores compared to women, who had mild-moderate ($p < 0.01$) scores. In relation to the category *behavioral disinhibition* in the group of DD patients, women were more likely to belong to the category of mild behavioral disinhibition (73.3%), while men presented a higher percentage of moderate (46.3%) or severe (19.5%) behavioral desinhibition. These differences were statistically significant ($p<0.05$). In the group of non-DD pa-

Table 1 Sociodemographical variables

VARIABLES	GENERAL SAMPLE	DUAL	NO DUAL
	N=112	n=56	n=56
AGE			
Mean	47.19	46.77	47.61
MARITAL STATUS			
Single	27.7	33.9	21.4
Married	45.5	51.8	39.3
Widower	1.8	-	3.6
Separated	12.5	5.4	19.6
Divorced	12.5	8.9	16.1
COEXISTENCE IN THE HOUSEHOLD			
Alone	10.7	8.9	14.3
With the partner	17	25	8.9
With the partner and children	38.4	41.1	37.5
With parents	17	12.5	21.4
Single parent family	8.9	7.1	10.7
With other relatives	5.3	-	3.6
With friends or mates	2.7	5.4	3.6
EDUCATION			
No studies	14.3	8.9	19.6
High school	33.9	41.1	26.8
Professional training	33	30.4	35.7
University degree	18.8	19.6	17.9
EMPLOYMENT			
Unemployed	50	53.3	46.4
Employed	33.9	33.9	33.9
Retired	14.3	12.5	16.1
Occupational disability	1.8	-	3.6

tients, no statistically significant differences were found (Table 3).

Analyzing the results of SIS, up to 52.7% of the sample had a significant result. 51.8% of non-DD patients presented a statistically significant score, while 53.6% of DD patients had a statistically significant score. The mean score for each subsection of this scale was: 5.47 for reward, 5.38 points in Automatism subsection, and finally, 7.54 points in Attentional subsection. No statistical significant differences were found regarding sex (Table 4).

Correlating craving and impulsivity, there is a positive correlation between the following parameters: total score of MACS and all parameters of SIS, and furthermore, desire to drink and all parameters of SIS. In addition, regarding DD patients and non-DD patients, there are differences about the patterns on correlations between both variables (Table 5).

Finally, analyzing differences according to sex, no correlations were found between craving and impulsivity in men. While in women, there were correlations between desire to drink and total score of MACS with the Automatism ($p<0.01$), Attentional ($p<0.01$) and Total score ($p<0.01$) of SIS. No correlations were found in non-DD women.

DISCUSSION

The current study suggests that there are no differences between craving and impulsivity among DD patients compared to non-DD patients, which indicates that both parameters are relative to alcohol use disorder and not to DD. Moreover, It was found a relationship between craving and state impulsivity in both groups, with no sex differences detected.

The prevalence of DD was 50%, which is within the wide range described by other studies conducted in DD (15-80%)[4,5,8,9,29]. Regarding sex differrences, the prevalence of DD in men was 48.23%, while in women was 55.5%, values that coincide with previous studies[5,30-32], and also, those studies point out that women could be more likely to present a psychiatric comorbidity[30-31].

As previous studies that analyzed craving intensity, non-DD patients presented higher craving intensity compared to DD patients[14,33], which could be justified by the insight difficulties of these patients. Although it is also important to mention that not all studies have found this finding, where psychiatric comorbidity is related to a higher craving intensity[5,34]. On the other hand, and unlike other studies, there was no difference in craving between sexes. Thus, for example, in a study conducted by Glöckner-Rist, Lémenager, Mann & the PREDICT Study Research Group (2013) found that men were more likely to report higher temptations when alcohol consumption was rewarding, while the effects of stress and anxiety did not change with respect to sex[35].

Analyzing impulsivity, more than 50% of the sample presented a statistically significant score of state impulsivity

Table 2 Screening of Dual Diagnosis through the Semi-Structured Interview MINI 5.0

	MINI-5		WHOLE SAMPLE			DD patients		
			T N=112	♂ n=85	♀ n=27	T N=56	♂ n=44	♀ n=12
A	Current MDE		**40.2**	37.6	48.1	**80.4**	78	86.7
	Recidivant MDD		**19.6**	21.2*	14.8	**39.3**	43.9	26.7
	MDE with melancholic features		**5.4**	2.4	14.8	**10.7**	4.9	26.7*
B	Dysthymic disorder		**11.6**	10.6	14.8	**23.2**	22	26.7
C	Suicide risk		**33.9**	31.8	40.7	**67.9**	65.9	73.3
		Mild	**16.1**	16.5	14.8	**32.1**	34.1	26.7
		Moderate	**8.9**	8.2	11.1	**17.9**	17.1	20
		High	**8.9**	7.1	14.8	**17.9**	14.6	26.7
D	Hypomanic episode	Current	**4.5**	5.9	-	**8.9**	12.2	-
		Past	**1.8**	2.4	-	**3.6**	4.9	-
	Manic episode	Current	**0.9**	-	3.7	**1.8**	-	6.7
		Past	**1.8**	1.2	11.1	**3.6**	2.4	6.7
E	Current panic disorder		**8.9**	8.2	3.7	**17.9**	17.1	20
	Lifetime panic disorder		**5.4**	5.9	3.7	**10.7**	12.2	6.7
F	Agoraphobia		**5.4**	5.9	3.7	**10.7**	12.2	6.7
G	Social phobia		**3.6**	3.5	3.7	**7.1**	7.3	6.7
H	Obsessive compulsive disorder		**2.7**	3.3	-	**5.4**	7.3	-
I	Posttraumatic stress state		**0.9**	-	3.7	**1.8**	-	6.7
K	Substance dependence		**14.3**	15.3	11.1	**12.5**	14.6	6.7
	Substance abuse		**12.5**	12.9	11.1	**8.9**	12.2	-
L	Current psychotic disorder		**-**	-	-	**-**	-	-
	Lifetime psychotic disorder		**1.8**	1.2	3.7	**3.6**	2.4	6.7
	Mood disorder with psychotic symptoms		**0.9**	1.2	-	**1.8**	2.4	-
M	Current anorexia		**1.8**	-	7.4*	**-**	-	-
N	Current bulimia		**-**	-	-	**-**	-	-
O	Generalized anxiety disorder		**9.8**	7.1	18.5	**19.6**	14.6	33.3
P	Antisocial personality disorder		**2.7**	3.5	-	**5.4**	7.3	-

MDE: Major Depressive episode; MDD: Recurrent Major Depressive Disorder; ♂: Men; ♀: Women. Category "J" is omitted since the dependency was considered a criterion for inclusion of the study. Data are presented in percentage (%)

*p<0.05

in the SIS. The fact that there are no significant differences between the two subgroups could be due to the fact that dual patients report higher levels of impulsivity since they would be not able to discern between the symptoms derived from their other psychiatric pathology from the impulsive symptoms themselves. Women had a higher prevalence of elevated impulsivity, which is consistent with previous studies[5,36]. Additionally, in the current study was found that

Table 3 Results of the Multidimensional Alcohol Craving Scale

		WHOLE SAMPLE			DD patients			NON-DD PATIENTS		
		T N=112	♂ n=85	♀ n=27	T N=56	♂ n=44	♀ n=12	T n=56	♂ n=41	♀ n=15
Desire of Drinking	Mi	**23.2**	24.7	18.5	**25**	22	33.2	**21.4**	27.3	-
	Mo	**66.1**	62.4	77.8	**60.7**	61	60	**71.4**	63.6	100
	I	**10.7**	12.9	3.7	**14.3**	17.1	6.7	**7.1**	9.1	-
Behavioral disinhibition	Mi	**41.1**	32.9	66.7	**44.6**	34.1	73.3	**37.5**	31.8	58.3
	Mo	**44.6**	50.6	25.9	**37.5**	46.3	13.3	**51.8**	54.5	41.7
	I	**14.3**	16.5	7.4	**17.9**	19.5	13.3	**10.7**	13.6	-
Total score	Mi	**26.8**	28.2	22.2	**28.6**	26.8	33.3	**25**	29.5	8.3
	Mo	**63.4**	60	74.1	**58.9**	58.5	60	**67.9**	61.4	91.7
		9.8	11.8	3.7	**12.5**	14.6	6.7	**7.1**	9.1	-

♂: Men; ♀: Women; Mi: Mild; Mo: Moderate; I: intense. All data is reported in percentages (%)

Table 4 Results of the State Impulsivity Scale

SIS	SAMPLE			NON-DD PATIENTS			DD PATIENTS		
	T N=112	♂ n=85	♀ n=27	T N=56	♂ n=44	♀ n=12	T n=56	♂ n=41	♀ n=15
Reward[a]	**5.47 (4.21)**	5.55 (4.24)	5.22 (4.17)	**5.93 (4.35)**	5.86 (4.37)	6.17 (4.49)	**5.02 (4.04)**	5.22 (4.13)	4.47 (3.87)
Automatism[a]	**5.38 (4.2)**	5.21 (4.05)	5.89 (4.67)	**5.21 (4.09)**	5.18 (4.17)	5.33 (3.94)	**5.54 (4.34)**	5.24 (3.99)	6.33 (5.27)
Attentional[a]	**7.54 (5.34)**	7.24 (5.36)	8.52 (5.21)	**7.30 (5.27)**	7.18 (5.5)	7.75 (4.48)	**7.79 (5.44)**	7.29 (5.28)	9.13 (5.82)
Significance[b]	**52.7**	51.8	55.6	51.8	51.2	53.3	53.6	52.3	58.3

♂: Men; ♀: Women; [a]These results are expressed as mean and standard deviation of the total scores for each item; [b] ≥17 points in men and ≥14 points in women, expressed as a percentage (%)

women had a greater clinical severity: higher prevalence of depressive symptoms, greater proportion of them in which the desire to drink is moderate-intense and higher levels of impulsivity.

It can be asserted that craving and impulsivity are closely related, so that the greater desire to consume alcohol, the greater impulsive behaviors may present the subject (either at reward, automatism or attentional level). These findings confirm previous results that show a relationship between craving and impulsivity[20]. In studies performed in patients with substance use disorders other than alcohol reported that individuals with higher scores on impulsivity experience greater desire to consume[37,38].

It should be noted that no previous studies have not been found on the relationship between craving and impulsivity in DD patients with alcohol use disorder. The results of the current study are consistent with previous research in patients with alcohol use disorder[11,20], in which a significant positive association between impulsivity (BIS-11) and emotional desire (AUQ) was found. It indicates that the increase in impulsivity is related to stronger impulses to drink.

Table 5 Correlations between MACS and SIS

			SIS			
			Reward	Automatism	Attentional	Total
MACS	Desire of drinking	DD patients	0.33*	0.25	0.31*	0.31*
		Non-DD patients	0.37**	0.31*	0.23	0.32*
		Total	0.35**	0.28**	0.27**	0.33**
	Behavioral disinhibition	DD patients	0.72	0.05	0.09	0.07
		Non-DD patients	0.31*	0.22	0.11	0.05
		Total	0.20*	0.13	0.15	0.17
	Global	DD patients	0.29*	0.24	0.30*	0.29*
		Non-DD patients	0.4**	0.33*	0.25	0.34**
		Total	0.35**	0.27**	0.27**	0.32**

MACS: Multidimensional Alcohol Craving Scale; SIS: Results of the State Impulsivity Scale.
*p<0.05. **p<0.01.

Altogether, it seems that in these patients, impulsivity and craving may mutually reinforce drinking behavior. Therefore, reducing impulsivity may also reduce craving levels[38,39], or vice versa, that reducing craving could reduce impulsivity[40]. Although this relationship between craving and impulsivity may also be due to the severity of alcohol use disorder[41].

This study should be analyzed in the focus of its limitations. Thus, for example, it was conducted in a transversal way, and with self-report questionnaires which could have a bias by the patients' perception, insight capacity and cognitive skill. Furthermore, it is necessary to emphasize the difficulty of making comparisons with previous studies due to the discrepancy of instruments used to measure craving and impulsivity, not to mention the large number of definitions in the current literature. However, the results should be considered since they provide new information about patients with alcohol use disorder, and also, in DD patients. In addition, the study was carried out in a clinical environment, representing the daily clinical care.

Finally, it can be concluded that there is a relationship between craving and impulsivity, which should be taken into account when planning treatment and designing relapse prevention strategies in patients with alcohol use disorder and DD patients.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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