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Attentional bias toward alcohol stimuli as a predictor of treatment retention in cocaine dependence and alcohol user patients

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ABSTRACT

Background: Attentional bias towards substance-related stimuli has shown to be involved in the development and maintenance of cocaine dependence. The relationship between alcohol use and cocaine dependence shown in literature justify the need of study these two substances jointly.

Methods: This paper analyzes patterns of attentional bias in 71 patients with cocaine dependence and compares these patterns according to whether occasional or problematic concurrent alcohol use is taken into account. It also analyzes whether attentional bias towards alcohol and cocaine-related stimuli predicts treatment retention. Attentional bias was evaluated with a visual probe task between 15 and 20 days after admission to treatment. Treatment status was recorded at a three-month follow-up. Severity of dependence and cocaine and alcohol craving were also measured.

Results: Results show that patients with cocaine dependence and problematic alcohol use show a pattern of approach towards alcohol stimuli (M = 8.32, SD = 27.01). In contrast, patients with cocaine dependence with occasional consumption of alcohol exhibit a pattern of avoidance of such stimuli (M = −7.23, SD = 19.20) (t = 2.79, p = 0.007). Logistic regression indicates that alcohol attentional bias is the only variable with predictive capacity (OR = 1.05, 95% CI = [1.01, 1.09]). It should also be noted that there is a pattern of avoidance of alcohol stimuli in patients who drop out of treatment.

Conclusion: The results of this study suggest the need to delve into whether therapeutic strategies involving deeper emotional processing or avoidance strategies are more suitable for preventing relapse.

1. Introduction

Recent reviews have pointed out that attention to drug-related stimuli is involved in regular drug use and substance use disorder (SUD) development (Anderson, 2016; Feil et al., 2010; Field et al., 2014, 2016; Leeman et al., 2014). In particular, studies from the literature have revealed changes in the maintenance of attention towards substance-related stimuli (Field and Cox, 2008). This phenomenon has shown differences between patients with cocaine and alcohol-related SUD and non-users (Copersino et al., 2004; Ersche et al., 2010; Hester et al., 2006). Additionally, among substance users, attentional bias has been shown to be linked to other variables such as subjective craving (Copersino et al., 2004; Field et al., 2013; Franken, 2003; Ryan, 2002; Field et al., 2005; Field et al., 2009), the frequency or the amount of substance consumption (Cox et al., 2002; Townshend and Duka, 2001; Sharma et al., 2001; Rooke et al., 2008) and the severity of dependency (Ryan, 2002).

The impact of attentional bias on therapeutic outcomes has been less well studied, and investigations have yielded conflicting results. Methodological aspects such as the samples used, the operational definition of adherence and relapse concepts or different outcome measures on tasks used may explain, at least partially, the discrepancies in the literature (Christiansen et al., 2014; Domínguez-Salas et al., 2016).

One aspect worth considering when studying attentional bias is the type of task used. In this regard, two types of paradigm have been primarily used: the drug-word Stroop task, and variants of the visual probe task. The drug Stroop task provides an indirect measure of attentional bias, measured through differences in reaction time to drug-related stimuli and neutral stimuli.

Within this paradigm, Carpenter et al. (2006) found that greater attentional bias towards cocaine stimuli was related to a shorter time spent in treatment and higher percentages of the drug detected in urine tests. Marhe et al. (2013a,b) found that an increased attentional bias measured at those times when the patient experienced subjective

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craving was associated with treatment withdrawal. However, Carpenter et al. (2012) found the opposite results. These authors found positive correlations between the interference Stroop score and various measures related to adherence to treatment. This effect was observed in the second phase of the therapeutic intervention, where the contingency management part of intervention was eliminated. Finally, other studies have found no relationship between attentional bias and therapeutic outcomes in alcohol (Cox et al., 2002; Snelleman et al., 2015) or cocaine abusers (Kennedy et al., 2014; Marhe et al., 2013a,b).

From a different perspective, the visual probe task has the added advantage of allowing a visuo-spatial assessment of selective attention towards consumption-related stimuli. In this way, it allows for distinguishing patterns of attentional bias (Field and Cox, 2008; Field et al., 2013). If the reaction time to the probe that replaces the drug stimulus is shorter than that to the probe replacing the neutral stimulus, it will indicate an approach pattern towards the drug-related cue. If, on the other hand, the reaction time is slower for the drug-related probe then this is taken to indicate that the patient is showing a pattern of avoidance towards that stimulus. Approach-avoidance patterns have been described in several studies when images exposure time is long enough – 500 ms or longer – to allow a change in the initial orientation of attention (Noël et al., 2006; Stormark et al., 1997; Townshend and Duka, 2007). In spite of its advantages, the visual probe task has been less extensively used than the Stroop task (Bardeen et al., 2014; Montgomery et al., 2010; Tull et al., 2011).

The studies of Garland et al. (2012) and Field et al. (2013), both with alcohol abusers, have linked the results of visual probe tasks to therapeutic outcomes. The latter demonstrated patterns of avoidance in subjects with low craving, and attentional approach bias in subjects with high craving scores. In terms of the relationship with therapeutic outcomes, no link was found between the premature abandonment of treatment and attentional bias. The study by Garland et al. (2012) calculated attentional bias as the difference between reaction times to consumption stimuli and neutral stimuli, but did not include an analysis of attention bias patterns. Although these authors found that the attentional bias was stronger in relapsing patients at six months, this relationship was not statistically significant.

Several authors have highlighted some limitations in terms of the ecological validity of results found in relation to attentional bias and SUD. For instance, Marks et al. (2015a) indicate that, in general, studies analyze the reactivity to consumption-related stimuli in an independent manner. This is found to be the case in attentional bias tasks that use cocaine stimuli for cocaine users (Carpenter et al., 2012; Marhe et al., 2013a,b), and alcohol-based stimuli for alcohol users (Cox et al., 2002; Field et al., 2013; Garland et al., 2012; Snelleman et al., 2015; Townshend and Duka, 2001). Epidemiological studies, on the other hand, indicate that the concurrent alcohol use is common among cocaine abusers (Substance Abuse and Mental Health Services Administration, 2012; Observatorio Español de las Drogas y las Toxicomanías (OEDT), 2016). In addition, alcohol use disorder (AUD) and cocaine SUD have been strongly associated. Stinson et al. (2005) reported an AUD prevalence of 79.35% in patients with cocaine SUD, while the prevalence of AUD among people without cocaine SUD was 8.27%. Moreover, Gossop et al. (2006) found changes in the consumption patterns of both substances when consumed concurrently. In particular, they indicated that more alcohol is consumed when it is taken concurrently with cocaine and vice versa. Further, it should be noted that the concurrent use of both substances potentiates the negative impact of each substance on health (Pennings et al., 2002).

In addition, the literature shows other evidence supporting the need to study these two substances jointly. For example, some studies have found a relationship between alcohol consumption and cocaine craving (Marks et al., 2015a), the presence of attentional bias towards alcohol in cocaine abusers (Marks et al., 2015b), and a relationship between alcohol use and poorer treatment outcomes in cocaine-dependent individuals (McKay et al., 1999) even in those patients with no alcohol dependence.

Similarly, differences in attentional bias have been observed depending on the degree of alcohol consumption. Townshend and Duka (2001) compared, in a sample of students, those that consumed more than 25 units of alcohol per week (heavy drinkers) with another group of non-drinkers or light drinkers, finding greater attentional bias in the group of heavy drinkers. In a similar study with students, Field et al. (2004) found greater attentional bias in heavy drinkers on trials with exposure durations of 500 and 2000 ms. In this study, the distinction was made between heavy and light drinkers according to the number of alcohol units consumed per week, although they employed a different criterion to that adopted by the Townshend and Duka (2001) study (heavy drinkers > 20 units of alcohol per week; light drinkers < 10 units a week). Field and Cox (2008) point out that the different criteria used to define problem drinking make the results of different studies difficult to compare, although it seems clear that problematic alcohol consumption – regardless of the criteria established to define such consumption – implies greater attentional bias.

These results suggest on the one hand the need to study these types of consumers in a specific way, analysing how the development of an AUD can modify the patterns of attentional bias and therapeutic results in cocaine SUD patients. Moreover, the inclusion of stimuli related to both substances in these types of tasks could help to improve the ecological validity of such procedures. By adopting this approach, the findings could help to promote a more realistic understanding of the phenomenon of relapse in polydrug user patients undergoing treatment.

Given the advantages of using the visual probe task for understanding the role that attentional bias may play in the therapeutic process, and considering the evidence of the relationships between alcohol and cocaine use, the objective of this study is to analyse whether attentional bias towards alcohol and cocaine-related stimuli predicts treatment retention in patients with cocaine dependence. A further objective was to analyse how concurrent alcohol use and AUD can modify such attentional patterns, as well as the therapeutic prognosis of these patients.

2. Method

2.1. Design

This study employed a longitudinal design, with a baseline evaluation at the beginning of treatment, and a follow-up assessment three months later.

2.2. Participants

The sample was composed of 71 patients undergoing treatment for cocaine dependence in public centers of the province of Huelva (Spain). The treatment in these centers is organized under a standardized protocol of action (Tirado Rodríguez, 2008). For patients who start treatment, the intervention consists of the attention of doctors and specialized psychologists. The care process is initially oriented towards the detoxification and implementation of motivational strategies. This phase comprises a minimum of three consultations per patient until the stabilization process is complete. Once the patients are stabilized, they continue the process of abstinence and extinction of the conditioned responses involved in relapses, focusing the intervention on the recognition of risk factors and control of craving. The intervention is carried out from a cognitive-behavioral approach and, if necessary, patients can receive supportive pharmacological treatment (according to the needs of each patient, the use of citicoline, antidepressants, myorelaxant, etc. may be recommended).

To participate in the study, patients had to meet the following inclusion criteria: (i) cocaine dependence according to DSM-IV, diagnosed by clinicians; and ii) present a history of concurrent alcohol use (consuming both substances at the same time or separately during the