



## Original article

## Higher severity of cocaine addiction is associated with tactile and somatic hallucinations



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## ABSTRACT

**Background:** The aim of this study is to describe the features of cocaine-dependent patients who have had cocaine-induced tactile/somatic hallucinations (CITSH), and to analyze the association with addiction-related variables and psychiatric comorbidity, comparing patients with CITSH, patients with cocaine psychotic symptoms (CIP) and no CITSH, and patients without any psychotic symptom.

**Method:** A cross-sectional study was conducted in 767 cocaine-dependent patients in an outpatient treatment center for addictions. The following data were obtained: sociodemographic characteristics, CIP information, addiction-related variables and psychiatric comorbidity. A bivariate and multivariate analysis was performed.

**Results:** Of the whole sample, 6.6% reported CITSH at some point of their lives, 48.4% had suffered some CIP other than CITSH, and 45% had not experienced any psychotic symptom. According to multivariate analysis, risk of overdose increases by 12.1 (OR) times the probability of having had CITSH compared patients with CIP-no-CITSH. Other variables associated to patients with CITSH were: age of drug use onset, presence of episodes of overdose, prevalence of psychotic disorder induced by cocaine. In general, in all variables studied, patients with CITSH presented worse clinical features (addiction variables and psychiatric comorbidity) than patients with CIP without CITSH and non-CIP group.

**Conclusion:** CITSH are usually associated with other psychotic symptoms induced by cocaine. The patients who experienced CITSH are more severe cases compared both with patients with CIP without CITSH and patients without CIP. Increased risk of overdose is an important issue in this type of patients.

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## 1. Introduction

Cocaine use and treatment seeking in Europe have grown in recent years. In Spain, an increase in prevalence of cocaine use was reported until 2008, from then cocaine use has had a stabilization among young adults [1]. Chronic use of cocaine may induce transient psychotic symptoms such as delusions or hallucinations, this syndrome is known as cocaine-induced psychosis (CIP). These symptoms usually disappear with cocaine abstinence [2–7]. Prevalence of CIP has been studied using diverse methodologies and settings, thereby, the prevalence of CIP oscillates in a wide range between 25–86% of cocaine users [8–13].

Some clinical and laboratory studies have helped to find risk factors for psychotic symptoms induced by cocaine [5,6,14–16]. Those risk factors could be divided in different subtypes, such as how cocaine is used, biological risk factors, psychiatric comorbidity and some clinical features. Thus, CIP has been associated with early onset of cocaine use [3,9,12,14], high doses of cocaine [6], parenteral [16,17] and smoked use [15]. Alterations in brain-derived neurotrophic factor (BDNF) have been related to CIP as a biological risk factor [18,19], and similarly, some medications with dopaminergic effect have related to CIP [20,21]. Finally, regarding to clinical features and psychiatric comorbidity, some personality traits like neuroticism [13] and impulsivity [22], along with attention deficit hyperactivity disorder (ADHD) [4,22] and antisocial personality disorder (APD) [6] have been associated with increased CIP frequency. Other factors, such as childhood trauma are not associated with intensity of psychotic symptoms that are induced by cocaine [23].

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Regarding to cocaine-induced tactile/somatic hallucinations (CITSH), these hallucinations are described as an “itching or pruritus sensation and tingling of hands, legs and back”. In severe cases, patients experience the feeling of bugs under the skin, which is called delusional parasitosis [24] or, occasionally, delusion of formication in cases of cocaine intoxication [25]. Some patients act consistently with these hallucinations with no criticizing them, and sometimes, they reach to erode the skin by rubbing, scratching and/or trying to remove the assumption animals. However, most of patients criticize the symptom [26,27]. It has been described that these hallucinations appear usually after a binge or after a few days of increased consumption of cocaine [27], nevertheless, there is insufficient evidence about it.

CITSH are more common in cocaine users than in patients with schizophrenia without cocaine use disorder [28]. However, these types of cocaine-induced hallucinations are less frequent than cocaine-induced auditory or visual hallucinations [3,11,22]. Prevalence of CITSH ranges between 7 and 32% among cocaine users [5,11,22,25,27,29–31]. This variability of the prevalence may depend on several factors, such as the type of interview used, which can vary from unstructured to completely structured interview, as well as, include more or less items [32,33]. Also, the settings where the investigations is performed, varying from laboratory studies [15] to clinical setting, or even, drug consumption rooms [34]. Although CITSH in cocaine users have been described long time ago [26,27], they have been scarcely studied and no research has specifically analyzed them. Probably, tactile and somatic hallucinations have been scarcely studied because large samples are needed to achieve statistical power in analyzing data. Thus far, most of the studies on CIP have been performed with limited samples. Moreover, CIP has been associated with more severe addiction and psychiatric outcomes compared to cocaine users without induced psychotic symptoms, thus, the study of these hallucinations has a special interest. Specifically, CITSH have been described as more frequent in cases of cocaine binge [27], which could be part and reflect a more severe addiction.

This study aims to describe characteristics of cocaine users who have had tactile and somatic hallucinations induced by cocaine consumption throughout their history of cocaine use. It is intended to study whether this type of hallucinations are related to the severity of consumption and presence of psychopathology, comparing between patients with CIP and CITSH (CITSH group), patients with CIP and no CITSH (CIP-no-CITSH group), and patients without CIP nor CITSH (non-CIP group). The hypothesis is that patients with CITSH have a worse addiction and more psychiatric comorbidities.

## 2. Methods

This is a cross-sectional study, conducted in the Addiction and Dual Diagnosis Unit of Vall d'Hebron Hospital, Spain, with cocaine-dependent patients that began treatment between January 2006 and May 2016. This study is part of a more extensive research on the comorbidity in cocaine dependence. Inclusion criteria were to be aged over 18, cocaine dependence according to DSM-IV-TR criteria, and signing the informed consent prior to participation. Exclusion criteria were to have primary psychotic disorder, severe somatic disease at baseline examination and low language proficiency. The project was approved by the Ethics Committee of the Vall d'Hebron Hospital. Patients did not receive any financial compensation. The evaluation process consisted of fourth interview sessions conducted by trained psychiatrists and psychologists. The psychiatrists performed the evaluation of substance use disorders, CIP and variables related to cocaine consumption in the first visit. Following, psychologists measured comorbidity with axis I, personality disorders and ADHD in the second, third and fourth interviews.

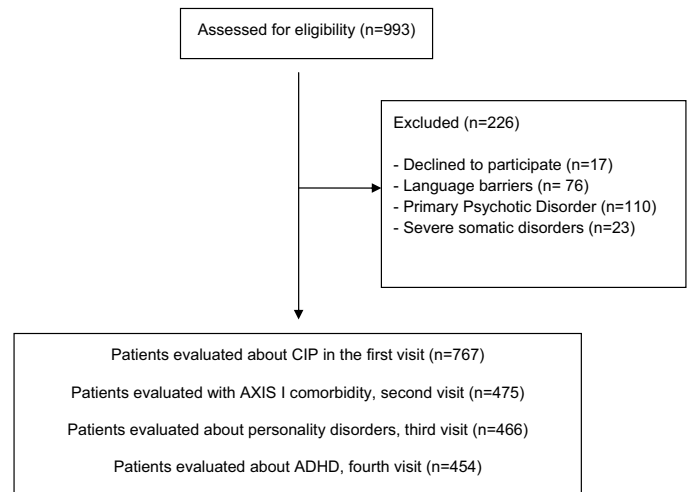


Fig. 1. Study flow chart.

### 2.1. Participants

As shown the flow chart of the study (Fig. 1), 767 patients were evaluated about CIP and were included in the study. No statistically significant difference between patients who participated and did not participate according sex ( $X^2 = 0.72$ ;  $P = 0.396$ ) and age ( $t = 1.03$ ;  $P = 0.302$ ) were found.

### 2.2. Data analysis

Data analysis was performed in three steps. Bivariate and multivariate analyses were performed. Firstly, the relationship between categorical variables was tested by Chi<sup>2</sup> test, whereas Analysis of Variance (ANOVA) was used to examine quantitative measures by the three groups studied (CITSH, CIP-no-CITSH, non-CIP). Student's *t*-test was used to compare the number of psychotic symptoms referred by patients with and without CITSH. In order to reduce false positive results, Bonferroni correction for multiple tests was performed according to the number of tests in each bivariate analysis. Only the variables that retained statistical significance after correction were included in a multivariate analysis. A multinomial regression analysis, using enter method was conducted. The dependent variable was polynomial (CITSH, CIP-no-CITSH, non-CIP). All statistical hypotheses were two-tailed. SPSS, version 20 for Windows was used for all analyses. R project was used to construct the boxplot.

### 2.3. Measures

#### 2.3.1. Cocaine-induced psychosis (CIP)

As previously has been published [6], trained psychiatrists conducted an interview in which the conclusions from the sensorceptive examinations were summarized. The patients were asked about the psychotic symptoms they had experienced under the influence of cocaine throughout their life. The questions included were:

- have you ever heard, or thought you heard, something that was not really there? Did it happen while you were under the effects of cocaine?
- have you ever seen, or thought you saw something, that was not actually there? Did it happen under the effects of cocaine?
- have you ever felt anything unusual on your body or on your skin? Did it happen while you were under the effects of cocaine?

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