

Facial emotion recognition deficits in abstinent cannabis dependent patients

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Abstract

Background: Cannabis is clearly the most popular illicit drug in North America, Europe and in other parts of the world. Evidence is accumulating for the involvement of the endocannabinoid system in emotional processing. However, only few studies examined emotional processing in chronic, heavy cannabis users and these studies were performed in cannabis dependent patients who were abstinent for 12–48 hours. The aim of this study was to investigate facial emotion identification and discrimination abilities in patients with cannabis dependence who were abstinent for at least 1 month.

Methods: The study included 30 males with cannabis dependency according to DSM-IV criteria and who had been abstinent for at least 1 month and 30 healthy controls. All the subjects were evaluated with Facial Emotion Identification Test (FEIT) and Facial Emotion Discrimination Test (FEDT).

Results: The main finding of this study was the presence of deficits in both identification and discrimination of facial emotions in cannabis dependent patients during abstinence. In addition, when we examined negative and positive emotions separately, we found out that abstinent cannabis dependent patients performed significantly worse than controls in the identification of negative emotions but not positive emotions.

Conclusions: Our findings indicate that facial emotion recognition deficits which have previously been observed in current cannabis users are still detectable in abstinent cannabis dependent patients and do not improve quickly with abstinence (an average of 3.2 months).

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1. Introduction

Facial emotions play a crucial role in social communication and interaction by providing information on individuals' mental state and inclinations. Impairments in the ability to perceive and respond to other people's emotional expressions can have 'devastating effects' on interpersonal and social functioning [1]. Of the wide range of emotions that people experience, a set of six basic emotions has been identified (happiness, sadness, fear, anger, disgust and surprise) from which more complex emotions are thought to be derived [2]. Studies showed facial emotional processing deficits in many psychiatric disorders, including depression [3], anxiety [4], schizophrenia [5,6] and bipolar disorder [7].

Emotional processing deficits have been reported in heavy users of a range of drugs. For example, inaccurate perception of facial emotional expressions has been observed in current and short-term abstinent users of MDMA [8], opiates [9], alcohol [10] and also in long-term abstinent poly-substance abusers [11]. Moreover, deficits in emotion recognition have been associated with greater interpersonal problems [12] and increased frequency of relapse [10].

Cannabis is clearly the most popular illicit drug in North America, Europe and in other parts of the world [13]. Therefore, it is of considerable importance to investigate whether consumption of the drug is associated with facial emotional processing deficits. Cannabis contains a number of chemical compounds collectively known as cannabinoids. The well documented psychoactive properties of cannabis are mainly due to one of these cannabinoids, delta-9 tetrahydrocannabinol (THC), via the central cannabinoid receptor CB1 [14]. Evidence is accumulating for the involvement of the endocannabinoid system in emotional processing [15], and a recent study showed that after THC

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administration, performance accuracy was decreased for stimuli with a negative emotional content (fearful faces), but not for stimuli with a positive emotional content (happy faces) in healthy subjects [16].

However, only few studies examined emotional processing in chronic, heavy cannabis users. An fMRI study reported that heavy marijuana smokers demonstrated relatively lower anterior cingulate and amygdale activity during the presentation of masked angry stimuli sets relative to the non-marijuana smoking control subjects [17]. A recent investigation revealed emotional processing deficits in chronic cannabis users [18]. Another study reported that heavy cannabis-users were significantly slower than controls at identifying emotional expressions [19]. However, these studies were performed in frequent cannabis users who were abstinent for 12–48 hours, and it is difficult to determine whether such deficits, observed after only 12–48 hours of abstinence, are temporary or long-lasting after a longer duration of abstinence. Findings of these studies might be due to sedative effects of cannabis, residue of cannabinoids in the brain or acute withdrawal effects from cannabis.

The aim of this study was to investigate facial emotion identification and discrimination abilities in patients with cannabis dependence who were abstinent for at least 1 month.

2. Methods

2.1. Participants

The study included 30 patients with cannabis dependency according to DSM-IV criteria and who had been abstinent for at least 1 month and 30 healthy controls. All the participants were male and the two groups were matched for age and duration of education. Cannabis dependent patients were referred to the treatment program from the criminal justice system. They were typically enrolled in the study after 1 month in treatment. Abstinence from cannabis and other drugs was monitored by clinical observation and urine drug screening for amphetamines, benzodiazepines, cannabis, cocaine and opiates at the 15th and 30th days (time of testing) of the treatment. Control subjects were recruited by means of local advertisements and snowball communication among adult people from the community.

Exclusion criteria for cannabis dependent group were: (1) more than 15 lifetime uses of any category of illicit drugs or positive urine screen for any illicit drug (except cannabis) or more than 12 alcoholic drinks/week. (2) history of DSM-IV Axis I psychiatric disorders or use of psychoactive medications, (3) history of loss of consciousness more than 10 min, (4) any severe hepatic, endocrine, renal disease, (5) current or past history of any significant neurological disorders, (6) visual impairment, colorblindness or hearing impairments.

Control subjects met the same criteria as patients, except for the history of cannabis dependency. All subjects were interviewed using the Structured Clinical Interview for DSM-IV Axis I Disorders [20] to exclude participants with

past or current comorbid Axis I diagnosis and to confirm the diagnosis of cannabis dependency in the dependent group. Cannabis dependent group was interviewed in order to determine the duration of cannabis use, the frequency of cannabis use, number of joints smoked per week prior to the period of abstinence and the time since the last cannabis use.

All of the participants were medication-free. We did not specifically test the subjects for alcohol use, Hep-C and other medical conditions. Our data were based on subjects' self-report, clinical examination and available medical records.

All subjects gave written informed consent to participate in the study. The study was approved by local ethics committees.

2.2. Measures

Facial Emotion Identification Test (FEIT) [21] involves black and white photographs of 19 different individuals' faces each depicting one of six different emotions (happiness, sadness, anger, surprise, fear, shame), shown one at a time for 15 seconds, with 10 seconds of blank screen between each stimulus presentation. Fifteen photographs depict negative emotions (for sadness 3, for anger 4, for fear 6, and for shame 2), while 4 photographs depict positive emotions (for happiness 2, and for surprise 2). In the administration of FEIT for this study, each participant was presented with these photographs of facial emotions on a laptop computer screen. The participant was provided with an answer form with 19 items, each with six choices of emotions. After each stimulus, the participant was required to select which of the six emotions was depicted on the picture and to mark it on the form. The total test score was computed as the number of correct answers (0–19). The test score for positive emotions was computed as the number of correct answers for positive emotions (0–4), and the test score for negative emotions was computed as the number of correct answers for negative emotions (0–15).

Facial Emotion Discrimination Test (FEDT) [21] consists of 30 pairs of black and white photographs, each pair showing two different people displaying one or two of the six emotions depicted in the FEIT. The pairs are presented simultaneously for 15 seconds, with 10 seconds of blank screen between each presentation. The task is to judge whether the two people in each pair have the same or different emotions. In the administration of FEDT for this study, each participant was presented with these photographs in the same set up as the FEIT. The participant was provided with an answer form with 30 items, each with two choices: "same", "different". After each stimulus, the participant was required to mark his/her response on the answer form. The score was computed as the number of correct answers (0–30).

2.3. Statistical analyses

The data were analyzed with the Statistical Package for the Social Sciences for Windows, Version 16.0 (SPSS Inc., Chicago, IL). Independent samples t test was used to compare cannabis dependent patients and controls for age

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