Drug and Alcohol Dependence xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Full length article

The profile of psychiatric symptoms exacerbated by methamphetamine use

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ARTICLE INFO

Article history:
Received 3 December 2015
Received in revised form 20 January 2016
Accepted 21 January 2016
Available online xxx

Keywords:
Methamphetamine
Amphetamine
Psychotic disorders
Schizophrenia
Substance-related disorders

ABSTRACT

Background: Methamphetamine use can produce symptoms almost indistinguishable from schizophrenia. Distinguishing between the two conditions has been hampered by the lack of a validated symptom profile for methamphetamine-induced psychiatric symptoms. We use data from a longitudinal cohort study to examine the profile of psychiatric symptoms that are acutely exacerbated by methamphetamine use.

Methods: 164 methamphetamine users, who did not meet DSM-IV criteria for a lifetime primary psychotic disorder, were followed monthly for one year to assess the relationship between days of methamphetamine use and symptom severity on the 24-item Brief Psychiatric Rating Scale. Exacerbation of psychiatric symptoms with methamphetamine use was quantified using random coefficient models. The dimensions of symptom exacerbation were examined using principal axis factoring and a latent profile analysis.

Results: Symptoms exacerbated by methamphetamine loaded on three factors: positive psychotic symptoms (suspiciousness, unusual thought content, hallucinations, bizarre behavior); affective symptoms (depression, suicidality, guilt, hostility, somatic concern, self-neglect); and psychomotor symptoms (tension, excitement, distractibility, motor hyperactivity). Methamphetamine use did not significantly increase negative symptoms. Vulnerability to positive psychotic and affective symptom exacerbation was shared by 28% of participants, and this vulnerability aligned with a past year DSM-IV diagnosis of substance-induced psychosis (38% vs. 22%, $\chi^2_{(df1)} = 3.66$, $p = 0.056$).

Conclusion: Methamphetamine use produced a symptom profile comprised of positive psychotic and affective symptoms, which aligned with a diagnosis of substance-induced psychosis, with no evidence of a negative syndrome.

1. Introduction

Methamphetamine and amphetamine (hereafter referred to collectively as methamphetamine) can produce a transient psychosis almost indistinguishable from acute paranoid schizophrenia (Angrist et al., 1974; Angrist and Gershon, 1970; Connell, 1966; McKetin et al., 2013). Differentiating between the two conditions with the existing diagnostic criteria is difficult based on presenting symptoms, resulting in misdiagnosis, suboptimal follow-up with a potentially poorer prognosis (Mathias et al., 2008). Given

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http://dx.doi.org/10.1016/j.drugalcdep.2016.01.018
0376-8716/

that around 30% of people diagnosed with methamphetamine-induced psychosis will be re-diagnosed with a schizophrenia spectrum disorder within 8 years (Niemi-Pynttari et al., 2013), reliable and validated symptom assessments are critical to minimizing initial errors and identifying whether transition to a primary psychotic disorder occurs. However, a validated symptom profile for methamphetamine-induced psychiatric symptoms is currently lacking.

A diagnosis of methamphetamine-induced psychosis is based on the DSM 5 criteria for substance-induced psychosis, which stipulates the presence of either delusions and/or hallucinations (American Psychiatric Association, 2013). Consistent with these criteria, most studies have noted the prominence of hallucinations and delusions, which are usually persecutory in nature (Akiyama, 2006; Angrist et al., 1974; Angrist and Gershon, 1970; Chen et al., 2003; Connell, 1966; Dore and Sweeting, 2006; Harris and Batki, 2000; Iwanami et al., 1994; Janowsky and Risch, 1979; Mahoney et al., 2008; Medhus et al., 2013; Srisurapanont et al., 2003). However, they fail to distinguish between methamphetamine-induced psychosis and schizophrenia on the remaining symptoms of schizophrenia (Hides et al., 2015; Medhus et al., 2013; Srisurapanont et al., 2003, 2011): disorganized speech (e.g., frequent derailment or incoherence), grossly disorganized or catatonic behavior, and negative symptoms (e.g., diminished emotional expression or avolition; American Psychiatric Association, 2013). Many studies report affective symptoms in methamphetamine-induced psychosis, including depressed mood (Akiyama, 2006; Hides et al., 2015; Iwanami et al., 1994), suicidal ideation (Akiyama, 2006), mania (Hides et al., 2015) and hostility (Akiyama et al., 2011; McKetin et al., 2008), but it is not clear whether these are core symptoms in methamphetamine psychosis or contemporaneous phenomena. Srisurapanont et al. (2011) found evidence of a positive syndrome (delusions, hallucinations and incoherent speech), a negative syndrome (poverty of speech, psychomotor retardation and flattened/incongruous affect) and an anxiety/depression syndrome (Srisurapanont et al., 2011), similar to that seen in people diagnosed with schizophrenia (Srisurapanont et al., 2011).

A key challenge is disentangling psychiatric symptoms caused by methamphetamine from those due to pre-existing psychiatric disorders (Mathias et al., 2008). Up to half of regular methamphetamine users have a comorbid psychiatric disorder, including 40% with major depression and 20% with a primary psychotic disorder (Glasner-Edwards et al., 2008; Hides et al., 2015; McKetin et al., 2011). Symptoms from these disorders can conflate the psychiatric symptom profile seen in people who use methamphetamine, making it difficult to identify diagnostic boundaries when making cross-sectional comparisons of symptom profiles. Excluding people with primary disorders does not fully address this problem because of the difficulty distinguishing between primary and substance-induced conditions (Mathias et al., 2008), and because participants may experience some pre-existing symptoms without fully meeting criteria for a primary disorder.

An alternative way to document what symptoms are induced by methamphetamine use is to examine which symptoms show a dose-related exacerbation during periods of methamphetamine use. Accordingly, we tracked the temporal concordance between level of methamphetamine use and psychiatric symptom severity in a longitudinal cohort of methamphetamine users who did not meet diagnostic criteria for a primary psychotic disorder. First, we examined the extent to which 24 psychiatric symptoms were exacerbated in a dose-related way with increasing methamphetamine use (with days of use as an indicator of methamphetamine dose). We then examined the factor structure of this symptom exacerbation to see whether it aligned with previously conceived notions of a positive syndrome, a negative syndrome and an anxiety/depressive syndrome. Finally, we used a latent profile analysis to see whether vulnerability to the identified symptom syndromes occurred in the same people, as would be expected if they reflected an underlying disorder. We also examined this latent symptom profile against a diagnosis of methamphetamine psychosis made using the Psychiatric Research Interview for DSM-IV Substance and Mental Disorders (PRISM-IV).

2. Method

2.1. Participants and procedure

Participants ($N = 164$) were methamphetamine users from the community who did not meet DSM-IV criteria for a lifetime primary psychotic disorder, assessed using the PRISM-IV Version 6 (Hasin et al., 1996). They were volunteers who self-identified as regular (monthly) methamphetamine users who were recruited through needle and syringe programs, word of mouth, and advertisements in magazines from Brisbane ($n = 92$), Melbourne ($n = 49$) and Sydney ($n = 23$), Australia (Hides et al., 2015). We excluded 24 participants who had a lifetime primary psychotic disorder, 7 who were not followed up, 4 who did not report methamphetamine use at follow-up, and 2 who had missing data on covariates. Participants provided informed consent prior to participation and they were reimbursed up to $30 AUD per interview; they were at least 18 years old, understood English and were willing to participate in follow-up interviews. The study received approval from the Griffith University Human Research Ethics Committee and this approval was ratified by other participating institutions.

At baseline, a face-to-face interview obtained psychiatric diagnoses, demographics, psychiatric and drug use history. Follow-up assessments of substance use and psychiatric symptom severity in the past month were undertaken monthly for one year (11 follow-ups in total). Follow-up interviews were conducted face-to-face at a mutually convenient location (e.g., at local health centres, cafes) or by phone where face-to-face interviews were not practical. Interviewers were psychology graduates who were trained in the interview protocol.

Participants completed a median of 11 follow-ups (range 1–11), with the majority of participants completing either 10 (22%) or all 11 follow-ups (57%). Psychiatric assessment data were complete for 78% of participants at follow-up (7–18% per follow-up were missing). There was no significant relationship between loss to follow-up and average days of methamphetamine use across the follow-up period ($r_s = 0.0002$, $p = 0.9918$), meeting the maximum likelihood estimate assumption of data that were missing at random.

2.2. Measures

2.2.1. Diagnoses. DSM-IV diagnoses were made using the PRISM-IV (Hasin et al., 1996), the best instrument currently available to reliably differentiate between substance-induced and other psychotic disorders (kappa 0.70–0.83; Torrens et al., 2004). The researchers were trained in the use of the PRISM by LH, an accredited user. Episodes of major depression and mania were identified using the Mini International Neuropsychiatric Interview Version 5.0.0 (Lecrubier et al., 1997), which has good validity against structured clinical interviews (kappas of 0.84 and 0.73, respectively; Sheehan et al., 1997).

2.2.2. Substance use. Days of methamphetamine use and other substance use in the past month were assessed using the Time-Line Follow-Back (TLFB). The TLFB is a validated measure of substance use (Fals-Stewart et al., 2000), which has 88% sensitivity, 96% specificity, a 95% hit-rate and 0.77 test-retest agreement for the use of amphetamines in the past 30 days (Fals-Stewart et al., 2000).

Please cite this article in press as: McKetin, R., et al., The profile of psychiatric symptoms exacerbated by methamphetamine use. Drug Alcohol Depend. (2016), http://dx.doi.org/10.1016/j.drugalcdep.2016.01.018