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Relationship between the duration of methamphetamine use and psychotic symptoms: A two-year prospective cohort study

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ABSTRACT

Background: Psychosis is a key harm associated with methamphetamine (MA) use. This study examined the relationship between the duration of MA use and risk of psychotic symptoms.

Methods: A cohort of 528 individuals with chronic MA use was followed for two years after leaving treatment center in Guangdong, China. Psychotic symptoms were assessed using the Positive and Negative Syndrome Scale at baseline and four follow-up visits (6, 12, 18 and 24 months after baseline). MA use during the past six months was investigated at each assessment. Generalized Estimating Equations for longitudinal panel data were developed to examine the risk of MA-associated psychotic symptoms among individuals with different durations of MA use. 340 MA users who completed at least one follow-up were included in the analysis.

Results: During 6-month intervals, participants who reported MA use showed a two-fold increase in the risk of psychotic symptoms compared to those with no MA use (odds ratio [OR] = 2.15, 95% confidence interval [CI] = 1.33–3.49). A dose-response effect was found between the duration of MA use and the risk of psychotic symptoms (continued 12-month MA use vs. no use: OR = 2.84, 95% CI = 1.39–5.77; continued 18-month MA use vs. no use: OR = 9.93, 95% CI = 3.58–27.57). There was no assessment for 24-month intervals due to a small sample size of the continuous use group.

Conclusions: Longer periods of MA use predicted a higher risk of experiencing psychotic symptoms. Early prevention of MA use could help reduce the risk of psychosis in MA users.

1. Introduction

The increasing popularity of amphetamine-type stimulants (ATS), particularly methamphetamine (MA), has become a major concern for global health experts. The World Drug Report 2016 showed that 35.7 million individuals used ATS in 2014, making ATS the second most commonly consumed class of drugs after cannabinoids. Methamphetamine-induced seizures accounted for the largest share of global ATS-induced seizures (United Nations Office on Drugs and Crime, 2016). Methamphetamine continues to dominate the market for ATS, especially in East and Southeast Asia (United Nations Office on Drugs and Crime, 2016). China has experienced a recent surge in MA use, and ATS have become the leading drug of abuse in China (Sun et al., 2014). Among registered illicit drug users, the proportion of individuals who use synthetic drugs – mostly ATS and ketamine – exceeded the number of heroin users in 2015, and the figure totaled 60.5% in 2016 (Office of China National Narcotic Control Commission, 2017).

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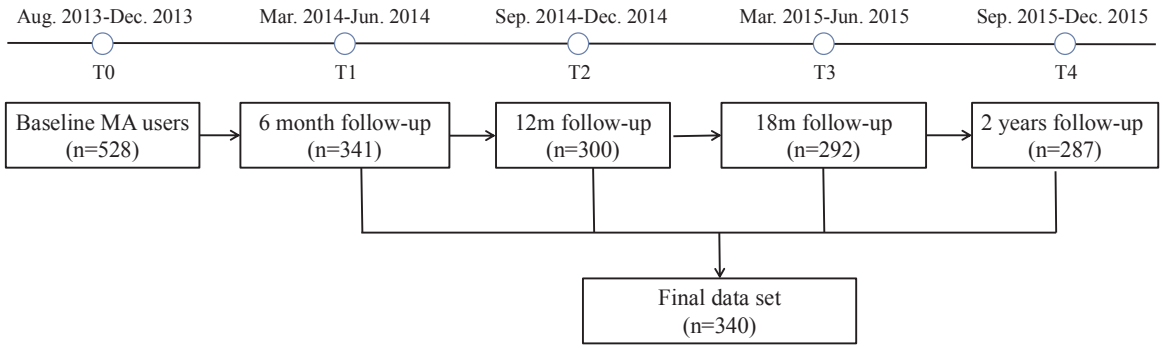

Fig. 1. Flow chart of the 2-year follow-up schedule.

A major health consequence of MA use is its association with the experience of psychotic symptoms (Harro, 2015), such as persecutory delusions and auditory hallucinations (Fasihpour et al., 2013). Research has estimated that the prevalence of psychotic symptoms among MA users is between 13% and 24% (McKetin et al., 2006; Salo et al., 2011; Sulaiman et al., 2014). The presence of MA-related psychotic symptoms is more common in MA users who are dependent on MA than those who are not (McKetin et al., 2006). Individuals with MA-related psychosis present high rates of later developing schizophrenia (Niemi-Pynttari et al., 2013) and other poor outcomes, including other serious psychiatric disorders (Eslami-Shahrbabaki et al., 2015), high health service utilization (Glasner-Edwards et al., 2008), and a high risk of premature death and suicidal behaviors over long-term follow-up (Kittirattanapaiboon et al., 2010). Considering the numerous negative consequences of MA-related psychosis, it is necessary to examine the factors that affect the development of psychosis in those who use MA to prevent and reduce its incidence.

Previous studies identified several factors that are associated with the presence, severity, and/or persistence of MA-related psychosis, including the intensity of MA use (Ding et al., 2014; Lichlyter et al., 2011; McKetin et al., 2006), a history of psychotic disorder (McKetin et al., 2006), a family history of psychosis (Chen et al., 2005), a family history of other mental illness (Farnia et al., 2016), psychiatric comorbidity (e.g., depression, bipolar disorder, and antisocial personality disorder) (McKetin et al., 2016; Sulaiman et al., 2014), and childhood adverse events (Ding et al., 2014). Psychotic symptoms vary as a function of differences in the amount, form, frequency, and duration of MA use (Ding et al., 2014; Lappin et al., 2016; Salo et al., 2013; Sulaiman et al., 2014). A dose-dependent relationship was found between the frequency of MA use and the risk for psychotic symptoms over a four-week period in one small cohort study (McKetin et al., 2013). Retrospective data from cross-sectional studies indicate that subjects with more years of chronic MA use had a higher prevalence and greater severity of psychosis (Ding et al., 2014; Lichlyter et al., 2011). However, the dose response link between the duration of MA use and the risk of developing psychotic symptoms over time is unknown. A better understanding of the prospective link between the duration of MA use and psychotic symptoms in larger longitudinal studies is important to inform both the detection and early treatment of MA-related psychotic symptoms. Thus, the present study examined the prospective relationship between the duration of MA use and psychotic symptoms, based on a two-year follow-up of a cohort of adults with chronic MA use.

2. Methods

2.1. Participants and procedure

The present study was part of a prospective cohort study that collected data on the prevalence, incidence, and risk factors of human immunodeficiency virus (HIV) and hepatitis C virus (HCV) infection in a sample of individuals who had recently used synthetic drugs and who were about to leave treatment centers (Wang et al., 2017). A total of 528 individuals with chronic MA use were recruited at baseline from compulsory and voluntary drug detoxification and rehabilitation centers in Guangdong province, China. Recruitment of the cohort occurred from August 1, 2013 to December 30, 2015. The inclusion criteria were as follow: (*i*) ≥18 years old, (*ii*) MA was the primary drug of abuse and urine tests were positive for MA at the time of treatment entry, and (*iii*) the participants were able to provide informed consent and were willing to participate in all study procedures. Participants were excluded if they had serious physical illnesses, such as cerebrovascular disease, cardiovascular disease, intellectual disability, or language disability. The research procedures were approved by the Institutional Review Board of Peking University Health Center, and written informed consent was obtained from all of the participants.

The study design comprised a baseline and four follow-up assessments. After providing written informed consent, a face-to-face structured interview was administered by trained interviewers with each participant at baseline and at four follow-up visits (6, 12, 18, and 24 months after the baseline interview). During baseline and follow-up, all of the investigations were confidential and no negative consequences were imposed on individuals who reported continued use of drugs. The follow-ups were conducted in the community after treatment. The procedure, meaning, and purpose of this study were clearly explained to the participants to enhance their participation in the follow-up. Efforts were also made to follow all participants through telephone calls and assistance of social workers in local community. Fig. 1 shows the schedule of the follow-up interviews.

2.2. Measures

2.2.1. Demographic and drug use characteristics at baseline

A self-administered structured questionnaire was used to collect demographic characteristics (age, gender, education, ethnicity, marital status, and employment status), and drug use history. Information about MA use before admission to the treatment centers included age at first MA use, form of MA typically used, main route of MA administration, frequency and duration of past use, MA dependence in the year prior to treatment, and other substance use. Methamphetamine dependence was defined according to the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition. Specifically, individuals who reported two or more of the following symptoms were defined as dependent: craving, tolerance, withdrawal, out-of-control drug use, preoccupation with drug, and use despite significant impairment.

2.2.2. Assessment of methamphetamine use

Data on MA use in the past six months prior to each study visit were collected at all follow-up interviews. The participants were asked whether or not they had used MA in the six months preceding each interview. Information on the dose, frequency, form, and route of MA use during the past six months was also recorded. Self-reported MA use was validated at follow-up using urine tests in a random sample of