



Profiles of psychiatric symptoms among amphetamine type stimulant and ketamine using inpatients in Wuhan, China



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ABSTRACT

Amphetamine type stimulants (ATS) and ketamine have emerged as major drug problems in China, and chronic extensive exposure to these substances frequently co-occurs with psychiatric symptoms. This study compares the psychiatric symptoms of patients reporting ATS use only, ATS and ketamine use, or ketamine use only who were admitted to an inpatient psychiatry ward in Wuhan, China between 2010 and 2011. Data on 375 study participants collected during their ward admission and extracted from their clinical records included their socio-demographics, scores on the Brief Psychiatric Rating Scale (BPRS), and urine toxicology screens.

Results: The ketamine-only group had significantly lower total BPRS scores and significantly lower scores on Thinking Disorder, Activity, and Hostility-Suspicion BPRS subscales than the ATS-only and ATS + ketamine groups ($p < 0.001$ for all comparisons). The ketamine-only group also had significantly higher scores on the subscales of Anxiety-Depression and Anergia. The ATS-only group had significantly higher scores on subscales of Thinking Disorder, Activity, and Hostility-Suspicion and significantly lower scores on Anxiety-Depression and Anergia subscales than the ketamine-only and ATS + ketamine groups ($p < 0.001$ for all comparisons). A K-means cluster method identified three distinct clusters of patients based on the similarities of their BPRS subscale profiles, and the identified clusters differed markedly on the proportions of participants reporting different primary drugs of abuse. The study findings suggest that ketamine and ATS users present with different profiles of psychiatric symptoms at admission to inpatient treatment.

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1. Objectives of the study and background

Amphetamine type stimulants (ATS) and ketamine have emerged as major drug problems in China and across Asia (United Nations Office on Drugs and Crime, 2012) and are associated with a broad range of psychiatric symptoms and disorders (Morgan and Curran, 2006; Srisurapanont et al., 2003). Repeated and extensive use of ATS may cause psychotic symptoms and is associated with mood disorders (Glasner-Edwards et al., 2008; Kalechstein et al., 2000; Zweben et al., 2004) and anxiety disorders (Conway et al., 2006). Ketamine users have been reported to present with symptoms that resemble both positive and negative symptoms of schizophrenia (Javitt and Zukin, 1991; Li et al., 2011; Umbricht et al.,

2000), as well as with cognitive impairments and depressive symptoms (Akiyama, 2006; Li et al., 2011). Chronic or heavy use of these substances may be associated with more severe psychiatric symptomatology necessitating inpatient treatment for some users (Akiyama, 2006; McKetin et al., 2006; Morgan and Curran, 2006; Morgan et al., 2010; Rawson and Ling, 2008; Smith et al., 2009; Ziedonis et al., 2003; Zweben et al., 2004).

In response to the increase in illicit ATS and ketamine use, as well as the increase in psychiatric disorders co-occurring with chronic use of these substances, and to address the increased need for hospital treatment associated with illicit ATS and ketamine use, Wuhan Mental Health Center in China developed a specialized inpatient psychiatric ward in July, 2007 exclusively for patients with psychotic disorders due to or concurrent with ATS or ketamine use. Although previous research supports an association between psychiatric symptoms and both ATS and ketamine use, it remains unclear whether specific psychiatric symptom presentations are

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more likely to co-occur with ATS as compared with ketamine use. In order to address these gaps in the research, the current study compares the psychiatric symptoms of patients reporting ATS use only, ATS and ketamine use, and ketamine use only who were admitted to an inpatient psychiatric unit in Wuhan, China between 2010 and 2011.

2. Materials and methods

The current study used data extracted from medical records of inpatients admitted between January 2010 and December 2011 to a specialized inpatient psychiatric ward in Wuhan, China that exclusively treats patients with psychiatric disorders due to or concurrent with amphetamine type stimulants (ATS) or ketamine use disorders.

Street ATS drugs commonly used in China include crystalline methamphetamine (called “ice”) and a variety of pills (called “maguo”). Street “ice” and “maguo” are most frequently manufactured in clandestine, illegal laboratories, and contain various forms of amphetamine and/or methamphetamine derivatives (often <10% of amphetamine or methamphetamine content) mixed with other chemicals to boost the potency or subjective effects for the users. Street ketamine in China (called “K” or “K fen”) is relatively inexpensive as compared to other drugs including ATS. It is sold as a powder or liquid and can be injected, inhaled, consumed in drinks, or mixed with marijuana or tobacco. The primary sources of street Ketamine in China include diversion or theft of legal pharmaceuticals from medical or veterinary licit trade with some supplies also manufactured in clandestine laboratories (United Nations Office on Drugs and Crime, 2010). It is therefore believed that the purity and the quality of street ketamine is high (no research data available) contributing to its increasing popularity among drug users in China.

During the study period, 437 patients were admitted to the ward, some of whom were admitted multiple times, generating a total of 1072 admissions during the two year study period. Admission criteria included: 1) diagnosis of psychotic disorder due to psychoactive substance use or abuse based on the International Classification of Diseases, Tenth Version (ICD-10) (diagnostic code F 1x.5) and 2) primary ATS or ketamine use disorder without history of heroin, cocaine, or cannabis use. ICD-10 diagnoses were determined by trained attending psychiatrists during an initial admission interview.

Patients who reported a history of an alcohol abuse/dependence disorder or had a severe medical disorder were not included in the study sample. Of the 437 patients admitted during the study period, 51 were excluded due to alcohol dependence and 11 due to a severe medical condition (including hyperpyrexia, severe frequent micturition, severe trauma, coma, minimally conscious state, or delirium like conditions that precluded communication with the patient), resulting in the final sample of 375 participants. For patients with more than one hospital admission during this period, data from the first admission were used.

In addition to the clinical interviews and evaluations, all patients provided a urine sample on the second morning of admission as part of hospital procedures. Urine samples were tested for ATS (methamphetamine and amphetamine), ketamine, heroin, methadone, cocaine, cannabis, and benzodiazepines, using enzyme multiplied immunoassay technique (EMIT). The Brief Psychiatric Rating Scale (BPRS) (Overall and Gorham, 1962) was also administered during admission to evaluate the severity of psychiatric symptoms.

The BPRS is an 18-item scale assessing a broad range of psychiatric symptoms. The BPRS has been translated into Mandarin and validated (Hedlund and Vieweg, 1980; Lee et al., 1990) and is widely used in China. The BPRS is administered via interview by trained clinicians, and scores are determined through ratings of symptom severity on a 7 point Likert scale (1 – not present to 7 – extremely

severe). Items are summed to produce a total score reflecting the overall severity of psychiatric symptoms. In addition to providing a total score, five symptom cluster scores are calculated: Anxiety-Depression (Somatic Concerns, Anxiety, Guilt, Depression), Anergia (Emotional Withdrawal, Motor Retardation, Blunted Affect, Disorientation), Thinking Disorder (Conceptual Disorganization, Grandiosity, Hallucinations, Unusual Thought Content), Activity (Tension, Mannerisms and Posturing, Excitement) and Hostility Suspicion (Hostility, Suspiciousness, Uncooperativeness) (Burger et al., 2000).

Demographic data on study participants, urine toxicology results and BPRS scores were extracted from patient records. No personally identifiable information on study participants was obtained. Study protocol was reviewed and approved by the Ethics Committee of the Wuhan Mental Health Center.

Participants were divided into three study groups based on their drug use history: A) ATS-only ($n = 125$), B) ketamine-only ($n = 38$), and C) ATS + ketamine ($n = 212$). Between group differences were analyzed using the χ^2 -test or Fisher's Exact Probability Test for categorical variables and either Student's t -test or ANOVA for continuous variables. We also used a K-means cluster method (Hartigan and Wong, 1979; MacQueen, 1967) to identify clusters of patients with similar symptom profiles on the five subscales of the BPRS. The K-means algorithm implemented in SPSS computationally searches for patterns among selected variables (BPRS subscale means) to uncover natural groupings among the study participants. In a stepwise, iterative manner, the algorithm initially assigns cluster membership using random groupings. The group means are then calculated and the cluster membership is evaluated and reassigned based on the distances between each participant data point and the group mean. This process is repeated until there are no changes in the cluster membership from the previous step/iteration. After identifying psychiatric symptom clusters using the K-means method, we compared study participants in each of the clusters based on primary drug of abuse.

3. Results

Participants were all Han Chinese and predominantly male (303/375, 81%). The majority of participants (301/375, 80%) reported less than 9 years of formal education, 155/375 (41%) were migrant workers, and 88/375 (24%) were unemployed. For the overall sample, the mean (SD) age was 30.2 (6.46) years. For males, the mean age was 30.8 (6.4) and for females it was 28.1 (6.5) years.

At admission, 86/125 (69%) of patients in the ATS-only group had an ATS positive urine result, 117/212 (55%) of patients in the ATS + ketamine group had an ATS positive and 98/212 (46%) had a ketamine positive urine result, and 17/38 (45%) of patients in the ketamine-only group had a ketamine positive urine result. No patients in the ATS-only group had a positive ketamine result and no patients in the ketamine-only group had a positive ATS urine result when they were admitted. The mean (SD) hospital stay for all study participants was 18.5 (SD = 9.7) days and the review of the medical records indicated that 367 had their discharge status indicating resolution or substantial amelioration of symptoms, 5 as improved, and 2 left before completing treatment.

The ketamine-only group had significantly lower total BPRS scores (40.13 ± 7.68 vs. 46.50 ± 6.24 and 47.28 ± 7.56) and significantly lower scores on Thinking Disorder (1.74 ± 0.57 vs. 3.15 ± 0.7 and 2.74 ± 0.84), Activity (1.61 ± 0.32 vs. 3.06 ± 0.68 and 2.81 ± 0.76), and Hostility-Suspicion (3.02 ± 0.77 vs. 4.81 ± 0.95 and 4.30 ± 1.03), subscales than the ATS-only and ATS + ketamine groups ($p < 0.001$ for all comparisons). The ketamine-only group also had significantly higher scores on the subscales of Anxiety-Depression (2.91 ± 0.49 vs. 1.53 ± 0.35 and

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