



The Survey of Prevalence and Content of Hallucinations and Delusions in Methamphetamine Dependents

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Abstract

Background: Methamphetamine use can lead to hallucinations and delusions, which can severely disrupt perception, thinking, emotion, and behavior and even cause self-harm and harm to others. Therefore, it is crucial to pay attention to the content of these experiences.

Objectives: This study aimed to investigate the prevalence and content of hallucinations and delusions in individuals with methamphetamine dependence.

Patients and Methods: This analytical cross-sectional study was conducted on 198 methamphetamine users recruited from compulsory residences using convenience sampling. The participants were interviewed individually using a structured checklist based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Data were analyzed using SPSS software using descriptive statistics, independent sample *t*-test, and the chi-square test.

Results: Auditory hallucinations (41.4%) and visual hallucinations (26.8%) were the most participants' common types of hallucinations. Persecution delusion (31.3%), grandeur delusion (17.7%), and reference delusion (16.7%) were the most common types of delusions reported. There were significant differences between the methamphetamine psychosis and non-psychosis groups regarding the rate, duration, and age of onset of methamphetamine use, as well as the prevalence of psychiatric diseases, suicide attempts, non-suicidal self-injury, and history of intoxication.

Conclusions: The early detection of psychosis symptoms in methamphetamine users through follow-up reviews can prevent the occurrence of more destructive individual and social complications caused by these experiences. It is essential to consider all types of hallucinations and delusions to implement timely preventive actions for individuals with methamphetamine dependence.

Keywords: Hallucinations, Delusions, Methamphetamine, High-risk Behaviors

1. Background

Thirty-five million people worldwide are affected by methamphetamine use, which is considered a significant public health problem, particularly in the United States and Southeast Asia (1). In Iran, methamphetamine is the second most commonly used illegal substance after narcotics (2). The psychological consequences of methamphetamine use are severe and include depression, anxiety, suicidal attempts, addiction, and violent behaviors (3, 4). Methamphetamine users are more likely to experience psychotic symptoms than those who use other substances due to their psychoactive properties (5). While short-term effects of methamphetamine use can be pleasurable, such as

euphoria, alertness, and increased libido, its long-term use can lead to adverse effects such as nausea, narcolepsy, decreased libido, and psychosis (4, 6). Psychiatric problems are common amongst those who use methamphetamine and often result in hospitalization in the emergency or psychiatric wards (7).

Several hypotheses exist regarding the occurrence of stimulant-triggered psychotic symptoms. Methamphetamine can inhibit dopamine reuptake and increase dopamine concentration in the synaptic cleft. This substance can trigger dopamine and norepinephrine release, creating a feeling of euphoria. Another hypothesis suggests that individuals with underlying mental disorders or genetically predisposing signatures for psychosis may be

more vulnerable to methamphetamine-induced psychotic symptoms (8, 9). Studies have designated parents' substance dependence as a predictor of substance-related psychosis (9).

The most common symptoms of psychosis among methamphetamine users include delusions, the tendency to harm oneself or others, paranoia, auditory, visual, and tactile hallucinations, and a tendency towards violence. These symptoms can lead to difficulties for individuals when communicating with others (10, 11). Auditory hallucinations, with a prevalence of about 75%, are the most prevalent hallucination in people consuming methamphetamine (12). However, research on the prevalence and content of different types of hallucinations is limited among methamphetamine users. Command hallucinations, a type of auditory hallucination, are commonly experienced by one-third of the individuals experiencing these events (13). These hallucinations involve hearing specific commands that may instruct individuals to engage in violent actions such as assault, arson, and vandalism (12). Approximately 44% of these commands tend to be aggressive and can lead to self-harm or even death, and 43% of criminal cases are linked with auditory hallucinations (14). The content of different types of hallucinations and delusions can sometimes be dangerous. Thus, early detection and intervention during the first three phases of a psychotic episode can prevent chronic psychotic disorders and dangerous behaviors by patients (15). Given the increasing use of methamphetamine in Iran and the lack of studies on the prevalence and content of methamphetamine-induced delusions and hallucinations, further research in this area is necessary.

2. Objectives

The aim of this study was to survey the prevalence and content of different types of hallucinations and delusions among Iranian methamphetamine users.

3. Patients and Methods

3.1. Population and Design

This analytical cross-sectional study was conducted between September 2018 and May 2019. Participants were selected among the drug addicts arrested by the police and undergoing treatment in compulsory addiction treatment centers in North Khorasan Province of Iran. A total of 198 individuals who tested positive for methamphetamine use and met our inclusion criteria were included in the study.

3.2. Sampling

One hundred ninety-eight men and women from Bojnurd and Shirvan Cities (North Khorasan Province, Iran) were transferred to rehabilitation centers for drug addiction treatment. Inclusion criteria were a positive test result for methamphetamine use, absence of severe cognitive impairments that could affect their ability to answer questions accurately, and willingness to participate in the study. The participants volunteered to take part in the study and signed an informed consent form. They were given assure that their names, tests, psychiatric examinations, and counseling would be kept confidential and provided free of cost. Individuals with severe mental disorders or those unable to complete the questionnaire/interview process were excluded from the study.

3.3. Study Questionnaires

The interviewers, who were clinical psychologists, utilized the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), to primarily diagnose methamphetamine psychosis (16). Patients with this condition were assessed for five categories of hallucinations, including auditory, visual, tactile, olfactory, and gustatory hallucinations. Also, delusions were evaluated in six categories: Grandiosity, persecution, reference, guilt, jealousy, and control. Patient data, such as age, sex, education level, the dosage of methamphetamine used, method of substance use, history of psychiatric diseases, and any previous experience of hallucinations or delusions, were also collected during interviews. The duration of each interview varied from 45 to 90 minutes, depending on the patient's condition and the interview process. This study was approved by the Ethics Committee of the North Khorasan University of Medical Sciences with the ethics approval code IR.NKUMS.REC.1397.029.

3.4. Analysis Method

The collected data were analyzed using SPSS software. Descriptive statistics, such as mean, frequency, and percentage, were used for data presentation. Additionally, the independent samples *t*-test and chi-square test were conducted for inferential analysis. A significance level of $P < 0.05$ was considered for all statistical procedures.

4. Results

A total of 198 methamphetamine users were surveyed, 144 (72.7%) of whom were men, and 54 (27.3%) were women. The mean age (standard deviation) of the patients was 36.33 (8.43) years, and their age range was from 19 to 60 years. Variables such as the place of residence, education

level, marital status, etc., have been summarized in [Table 1](#), and information about substance use has been displayed in [Table 2](#).

[Table 3](#) compares the history of illicit substance use and a history of high-risk behaviors between psychotic and non-psychotic methamphetamine users.

As can be seen in [Table 3](#), there were significant differences between psychotic and non-psychotic individuals in terms of the daily dose of methamphetamine use ($P = 0.008$), duration of methamphetamine use ($P = 0.004$), the starting age of methamphetamine use ($P = 0.004$), history of psychiatric disorders ($P = 0.026$), suicide attempts ($P = 0.003$), self-harm ($P = 0.000$), and overdose ($P = 0.012$).

Based on the results, 99 (50%) of the methamphetamine users had hallucinations. The frequencies and percentages of various types of hallucinations (auditory, visual, tactile, olfactory, and gustatory) have been presented in [Table 4](#).

Of all the participants, 93 patients (47%) were diagnosed with psychosis, and the remaining 105 people did not meet the diagnostic criteria for methamphetamine-induced psychosis. It should be noted that some individuals may experience one or more types of hallucinations or delusions without fulfilling the diagnostic criteria for psychosis. Out of 99 people experiencing one or more types of hallucinations, 81 (87.1%) met the diagnostic criteria for methamphetamine-induced psychosis, and other 18 (18.2%) individuals did not fulfill the diagnostic criteria for psychosis.

Of those with auditory hallucinations, 63 (74.4%) experienced second-person hallucinations (i.e., command hallucination), and 39 (46.6%) experienced third-person hallucinations (i.e., hearing voices). The content of hallucinations in methamphetamine users with auditory hallucinations included self-harm (34.1%), harm to others (30.5%), suicide (24.4%), and homicide (7.3%). In this study, 88 people (44.4%) experienced delusions, the content of which has been shown in [Table 5](#).

Of the 88 people who had delusions, 66 (71%) met the diagnostic criteria for methamphetamine-induced psychosis, and others (22, 20.9%) had one or more types of delusions without meeting the diagnostic criteria for psychosis.

5. Discussion

This research examined and compared the prevalence of different types of hallucinations and delusions, as well as high-risk behaviors, among methamphetamine users with or without methamphetamine-induced psychosis. We found that 47% of the studied population had persistent methamphetamine-induced psychosis, which was

similar to the findings of Ahmad Hatim's study (17). Also, the longitudinal study of Niemi-Pynttari et al. showed that 30% of people with a history of methamphetamine-induced psychosis developed psychotic illnesses (18), requiring early treatment and follow-up to prevent them from becoming chronic and suggesting that the risk factors related to schizophrenia may increase the likelihood of methamphetamine-induced psychosis; nevertheless, further investigation is needed (19).

Regarding the history of consuming methamphetamine, there were significant differences between the psychotic and non-psychotic groups in terms of the amount, age of starting, and duration of use. The participants of the psychotic group revealed significantly higher age of starting methamphetamine use, duration of use, and amount of consumption compared to non-psychotic people. Demographic characteristics were not significantly associated with methamphetamine psychosis. Arunogiri et al. also found a relationship between the frequency-intensity of methamphetamine use and psychosis, but no relationship was found between psychosis and socio-demographic factors (19).

We found no significant correlation between the concurrent use of methamphetamine and other illicit substances and the incidence of methamphetamine psychosis. However, other studies have reported a link between the use of multiple substances and methamphetamine psychosis. These conflicting findings highlight the need for further research to gain a deeper understanding of less-characterized risk factors of psychosis in this population, including family history, childhood traumas or stress, and social support (19).

The comparison between the psychotic and non-psychotic groups revealed significant differences in the prevalence of psychiatric disorders, suicide attempts, self-harm, and history of intoxication. We noticed that 39.7% of patients with methamphetamine-induced psychosis had a history of at least one psychiatric illness, which was consistent with previous research reporting a prevalence of 41.4% (20). This observation supports the hypothesis that individuals with underlying psychiatric conditions are more likely to experience methamphetamine-induced psychotic symptoms (8, 21).

We also observed a significant difference in the prevalence of suicide and self-mutilation behaviors between the psychotic and non-psychotic groups. The high prevalence of these behaviors highlights the need for early interventions to reduce trauma-related injuries and complications in these people. Takahashi et al. reported that 76.1% of methamphetamine users experienced at least one traumatic event during childhood, such as parental death or divorce and psychological abuse, which was significantly re-

Table 1. Demographic Characteristics of the Participants (n = 198)^a

Variables	No. (%)
Sex	
Male	144 (72.7)
Female	54 (27.3)
Place of residence	
Urban	143 (72.2)
Rural	55 (27.8)
Marital status	
Married	95 (48)
Single	50 (25.3)
Divorced	40 (20.2)
Widow/Widower	6 (3)
Second marriage (with a history of previous divorce)	7 (3.5)
Education	
Illiterate	27 (13.6)
Primary education	48 (24.2)
Middle school	68 (34.3)
Secondary education	12 (6.1)
High school diploma	29 (14.6)
Associate degree and higher	14 (7.1)
Employment	
Employed	117 (59.1)
Unemployed	78 (38.9)
Occupation	
Civil servant	7 (3.5)
Business	67 (33.8)
Manual worker	46 (23.2)
Farmer	4 (2)
Household	19 (9.5)
History of psychiatric diseases	
Yes	64 (32.3)
No	133 (67.2)
Age range	19 - 60

^a Data are expressed as No. (%) except for the age range.

lated to suicidal attempts and behaviors (4). Additionally, a previous study affirmed a relationship between childhood traumas and psychotic symptoms (22). Therefore, addressing childhood traumas may be crucial for preventing suicidal behaviors and reducing the risk of developing psychotic symptoms among methamphetamine users.

The findings of this study revealed that the most frequent types of hallucinations were auditory, visual, tactile,

olfactory, and gustatory types, respectively. A study conducted by Zarrabi et al. revealed that auditory hallucinations (51.3%) were the most common symptom in patients with methamphetamine-induced psychosis, followed by visual hallucinations (18.4%) (23). Similarly, Fasihpour et al. reiterated that auditory (7.3%) and visual (44.1%) hallucinations were the most prevalent types of hallucinations among methamphetamine users (20), which was consis-

Table 2. History of Illicit Substance Use and High-risk Behaviors ^a

Variables	Values
The age of starting substance use	23.23 ± 9.01
Duration of use (y)	12.18 ± 8.38
Daily use of methamphetamine (g)	1.08 ± 0.99
Method of use	
Smoking	171 (73.2)
Oral	14 (7.1)
Injection	13 (4.5)
Treatment history	
No	22 (11.1)
Yes	176 (88.9)
Illicit drugs simultaneously used with methamphetamine	
Opium	110 (55.6)
Heroin	109 (55.1)
Cannabis	21 (10.6)
Cigarette	58 (29.3)
Alcohol	29 (14.6)
High-risk behavior	
Suicide	58 (29.3)
history of incarceration	115 (58.1)
Self-harm	52 (26.3)
High dose	19 (9.6)
Injection	13 (6.6)
Multiple sex partners	33 (16.7)
Method of treatment	
Methadone maintenance therapy	173 (87.4)
Opium tincture	4 (2)
Detoxification via buprenorphine	12 (6.1)
Syringe sharing	
Yes	194 (97.9)
No	4 (2.02)

^a Values are expressed as mean ± SD or No. (%).

tent with our results.

According to our findings, the frequencies of second-person and third-person auditory hallucinations were 61.2% and 38.8%, respectively. In contrast, Shelly et al., who assessed 33 patients suffering from methamphetamine-induced psychosis, reported a prevalence of 36.4% for second-person and 48.5% for third-person auditory hallucinations (24). In our study, the highest prevalence was related to second-person psychotic hallucinations with content related to self-harm, suicide, and murder. It is cru-

cial to consider the content of auditory hallucinations, particularly commanding hallucinations that may lead to high-risk behaviors, to prevent high-risk behaviors among methamphetamine consumers.

Moreover, our study revealed that delusions were prevalent in methamphetamine-induced psychosis, with a prevalence of 71%. Among these, persecution (49.4%), grandiosity (30.2%), and reference (27.9%) delusions were the most common types observed.

We noticed that even individuals without persistent

Table 3. Comparison of Histories of Illicit Substance Use and High-risk Behaviors Between Psychotic and Non-psychotic Methamphetamine Users^a

Variables	Psychotic (n = 93)	Non-psychotic (n = 105)	P
Daily dose of methamphetamine (g)	1.28 ± 1.05	0.9 ± 0.92	0.008
Duration of methamphetamine use (y)	14.03 ± 8.16	10.56 ± 28.8	0.004
The age of starting methamphetamine use	21.3 ± 8.20	36.28 ± 8.65	0.004
Age (y)	36.54 ± 8.20	36.28 ± 8.61	0.83
Simultaneous use of methamphetamine and opium			0.12
Yes	47 (43.1)	63 (56.9)	
No	46 (52.3)	42 (47.7)	
Simultaneous use of methamphetamine and heroin			0.09
Yes	56 (59.1)	52 (58.4)	
No	37 (41.6)	28 (53.1)	
Gender			0.49
Male	67 (46.95)	76 (53.1)	
Female	26 (48.1)	28 (51.9)	
Education level			0.26
Lower than high-school diploma	70 (45.5)	84 (54.5)	
High school diploma and higher	22 (52.4)	75 (52.8)	
Place of residence			0.55
Urban	67 (47.2)	75 (52.8)	
Rural	26 (47.3)	29 (52.7)	
History of psychiatric disorders			0.026
No	91 (75.8)	47 (60.3)	
Yes	29 (24.2)	31 (39.7)	
Suicide attempts			0.003
No	97 (80.8)	48 (61.5)	
Yes	23 (19.2)	30 (38.5)	
Self-harm			0.000
No	104 (86.7)	46 (62.8)	
Yes	16 (13.3)	32 (59.7)	
History of incarceration			0.079
No	61 (50.8)	29 (37.3)	
Yes	59 (49.2)	49 (62.8)	
Overdose			0.012
No	114 (95.0)	65 (83.3)	
Yes	6 (5.0)	13 (16.7)	
Substance injection			0.115
No	116 (96.7)	71 (91.0)	
Yes	4 (3.3)	7 (9.0)	
Multiple sex partners			0.056
No	108 (90.0)	62 (79.5)	
Yes	12 (10.0)	16 (20.5)	

^a Values are expressed as mean ± SD or No. (%).

Table 4. Frequency of Hallucinations in Methamphetamine Users (n = 198)

Type of Hallucination	No. (%)
Auditory	82 (41.4)
Visual	53 (26.8)
Tactile	22 (11.1)
Olfactory	3 (1.5)
Gustatory	4 (2)

Table 5. Prevalence of Delusions in Methamphetamine Users (n = 198)

Types of Delusion	No. (%)
Grandiosity	35 (17.7)
Persecution	62 (31.3)
Reference	33 (16.7)
Guilt	20 (10.1)
Control	20 (10.1)
Jealousy	8 (4)

methamphetamine-induced psychosis might experience temporary hallucinations or delusions. So, it is crucial to monitor these people for transient psychotic symptoms, as research suggests that stressful situations and frequent methamphetamine use can lead to the recurrence of psychosis (9). Visual hallucinations, in particular, may indicate the onset of methamphetamine psychosis (9), and some psychotic symptoms have been linked to violent behavior (25). Therefore, it is essential for a specialist to accurately evaluate psychotic symptoms in medical settings where individuals seek treatment or are hospitalized with acute symptoms related to methamphetamine use, where targeted therapy based on accurate assessment is of utmost importance. Overall, caution should be taken when generalizing our results to all methamphetamine users in Iran because the drug is often used in combination with opium or other substances. Additionally, our sample consisted of only inpatients, who may not be representative of all methamphetamine users in the country.

This study found that individuals who have not been diagnosed with stable methamphetamine-induced psychosis may experience temporary hallucinations or delusions. As researchers suggest that stressful situations and repeated use of methamphetamine could lead to relapse into psychosis, it is crucial to monitor these transient psychotic symptoms in this population (9). Visual hallucinations, in particular, may indicate the onset of methamphetamine psychosis (9), and some psychotic symptoms are linked to violent behavior (25).

One limitation of this study was that our sample population was confined to compulsory treatment centers, so it

might not accurately represent the diverse community of methamphetamine users. This was due to limited access to the general population of methamphetamine users. Additionally, the psychiatric history of patients was solely obtained by self-reporting, which might have impacted the validity of the data collected. Future studies in this field should consider selecting a larger sample size and recruiting people from the community and outpatient treatment centers to obtain more accurate and generalizable information on these patients and their families.

5.1. Conclusions

In general, our findings indicated that methamphetamine users frequently experienced delusions and engaged in high-risk behaviors. The most common types of hallucinations were auditory, visual, tactile, olfactory, and gustatory, and the most frequent delusions were persecution, grandiosity, reference, guilt, control, and jealousy. There was a significant difference between methamphetamine users with psychosis and those without psychosis in terms of duration of use, age of onset, prevalence of psychiatric diseases, suicide attempts, self-harm behaviors, and history of overdose. Given the correlation between methamphetamine use and psychotic symptoms, it is important to carefully evaluate the history of substance use and examine psychotic symptoms among consumers to develop a targeted therapy plan. Identifying individuals with specific psychotic symptoms is crucial for preventing serious complications associated with methamphetamine use. These observations highlight the importance of secondary preventive measures in reducing the harm and psychosis caused by methamphetamine consumption. Future studies should focus on the cause-effect relationship between observed differences in the two groups.

Footnotes

Authors' Contribution: Study concept and design: Seyed Kaveh Hojjat and Ali Nazari; literature search: Asiyeh Jafakesh Moghadam and Faezeh Kaviyani; data acquisition, Faezeh Kaviyani, Asiyeh Jafakesh Moghadam, Mohammad Khorrami, Javad Sherafati, Mostafa Akbarzadeh, and Zahra Barati Farimani; data analysis: Mina Norozi Khalili; drafting of the manuscript: Faezeh Kaviyani, Asiyeh Jafakesh Moghadam, and Hadi Akbari.

Conflict of Interests: The authors declare that they have no conflict of interest.

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Informed Consent: Participants volunteered to take part in the study and signed an informed consent form.

References

- Substance Abuse and Mental Health Services Administration. *Results from the 2013 National Survey on Drug Use and Health: Mental Health Findings*. Rockville, USA: Substance Abuse and Mental Health Services Administration; 2013.
- Mehrjerdi ZA. A brief overview of methamphetamine use treatment in Iran: Intervention and practice. *J Res Med Sci*. 2013;**18**(12):1018–20. [PubMed ID: [24523790](#)]. [PubMed Central ID: [PMC3908520](#)].
- Sulaiman AH, Said MA, Habil MH, Rashid R, Siddiq A, Guan NC, et al. The risk and associated factors of methamphetamine psychosis in methamphetamine-dependent patients in Malaysia. *Compr Psychiatry*. 2014;**55** Suppl 1:S89–94. [PubMed ID: [23433219](#)]. <https://doi.org/10.1016/j.comppsy.2013.01.003>.
- Takahashi M, Yamaki M, Kondo A, Hattori M, Kobayashi M, Shimane T. Prevalence of adverse childhood experiences and their association with suicidal ideation and non-suicidal self-injury among incarcerated methamphetamine users in Japan. *Child Abuse Negl*. 2022;**131**:105763. [PubMed ID: [35810637](#)]. <https://doi.org/10.1016/j.chiabu.2022.105763>.
- McKetin R, Hickey K, Devlin K, Lawrence K. The risk of psychotic symptoms associated with recreational methamphetamine use. *Drug Alcohol Rev*. 2010;**29**(4):358–63. [PubMed ID: [20636650](#)]. <https://doi.org/10.1111/j.1465-3362.2009.00160.x>.
- Siahjani L, Oraki M, Zare H. [Length of methamphetamine abuse and sustained attention disorders among methamphetamine abusers]. *Research on Addiction*. 2013;**7**(27):53–66. Persian.
- Zarghami M. Methamphetamine Has Changed the Profile of Patients Utilizing Psychiatric Emergency Services in Iran. *Iran J Psychiat Behav Sci*. 2011;**5**(1):1–5.
- Ahmadkhaniha HR, Alavi K, Hadi F. Prolonged Methamphetamine-Induced Psychosis: Difference With Schizophrenia. *Acta Med Iran*. 2019. <https://doi.org/10.18502/acta.v57i4.1843>.
- Grant KM, LeVan TD, Wells SM, Li M, Stoltenberg SF, Gendelman HE, et al. Methamphetamine-associated psychosis. *J Neuroimmune Pharmacol*. 2012;**7**(1):113–39. [PubMed ID: [21728034](#)]. [PubMed Central ID: [PMC3280383](#)]. <https://doi.org/10.1007/s11481-011-9288-1>.
- Lecomte T, Mueser KT, MacEwan W, Thornton AE, Buchanan T, Bouchard V, et al. Predictors of persistent psychotic symptoms in persons with methamphetamine abuse receiving psychiatric treatment. *J Nerv Ment Dis*. 2013;**201**(12):1085–9. [PubMed ID: [24284645](#)]. <https://doi.org/10.1097/NMD.0000000000000059>.
- Bastos FAR. *Pro-Ana websites and its impact on the quality of life of anorexic patients [dissertation]*. Lisbon, Portugal: University of Lisbon; 2016.
- Kaplan HI, Sadock BJ, Grebb JA. *Kaplan and Sadock's synopsis of psychiatry: Behavioral sciences, clinical psychiatry*. Philadelphia, USA: Williams & Wilkins Co; 2007.
- Waters F, Fernyhough C. Hallucinations: A Systematic Review of Points of Similarity and Difference Across Diagnostic Classes. *Schizophr Bull*. 2017;**43**(1):32–43. [PubMed ID: [27872259](#)]. [PubMed Central ID: [PMC5216859](#)]. <https://doi.org/10.1093/schbul/sbw132>.
- Andrew EM. *Command hallucinations and the risks of violence and self-harm: What distinguishes compliers from non-compliers? [dissertation]*. Cardiff, The United Kingdom: Cardiff University; 2010.
- McGorry PD. Early intervention in psychosis: obvious, effective, overdue. *J Nerv Ment Dis*. 2015;**203**(5):310–8. [PubMed ID: [25919380](#)]. [PubMed Central ID: [PMC4414340](#)]. <https://doi.org/10.1097/NMD.0000000000000284>.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Washington, DC, USA: American Psychiatric Association; 2013. <https://doi.org/10.1176/appi.books.9780890425596>.
- Ahmad Hatim S. *Methamphetamine dependence in Malaysia: psychiatric co-morbidity and suicidality, methamphetamine induced psychosis, genetic polymorphisms and efficacy of aripiprazole in the treatment of methamphetamine dependence [dissertation]*. Kuala Lumpur, Malaysia: University of Malaya; 2011.
- Niemi-Pynttari JA, Sund R, Putkonen H, Vormaa H, Wahlbeck K, Pirkola SP. Substance-induced psychoses converting into schizophrenia: a register-based study of 18,478 Finnish inpatient cases. *J Clin Psychiatry*. 2013;**74**(1):e94–9. [PubMed ID: [23419236](#)]. <https://doi.org/10.4088/JCP.12m07822>.
- Arunogiri S, Foulds JA, McKetin R, Lubman DI. A systematic review of risk factors for methamphetamine-associated psychosis. *Aust N Z J Psychiatry*. 2018;**52**(6):514–29. [PubMed ID: [29338289](#)]. <https://doi.org/10.1177/0004867417748750>.
- Fasihpour B, Molavi S, Shariat SV. Clinical features of inpatients with methamphetamine-induced psychosis. *J Ment Health*. 2013;**22**(4):341–9. [PubMed ID: [23323572](#)]. <https://doi.org/10.3109/09638237.2012.745184>.
- Ahmadkhaniha H, Ayazi N, Alavi K, Najjarzadehgan M, Hadi F. The Comparison Between Positive and Negative Symptoms Severity in Prolonged Methamphetamine-induced Psychotic Disorder and Schizophrenia. *Basic Clin Neurosci*. 2022;**13**(3):325–33. [PubMed ID: [36457876](#)]. [PubMed Central ID: [PMC9706289](#)]. <https://doi.org/10.32598/bcn.2021.2837.1>.
- Grindey A, Bradshaw T. Do different adverse childhood experiences lead to specific symptoms of psychosis in adulthood? A systematic review of the current literature. *Int J Ment Health Nurs*. 2022;**31**(4):868–87. [PubMed ID: [35306711](#)]. <https://doi.org/10.1111/inm.12992>.
- Zarrabi H, Khalkhali M, Hamidi A, Ahmadi R, Zavarmousavi M. Clinical features, course and treatment of methamphetamine-induced psychosis in psychiatric inpatients. *BMC Psychiatry*. 2016;**16**:44. [PubMed ID: [26911516](#)]. [PubMed Central ID: [PMC4766712](#)]. <https://doi.org/10.1186/s12888-016-0745-5>.
- Shelly J, Uhlmann A, Sinclair H, Howells FM, Sibeko G, Wilson D, et al. First-Rank Symptoms in Methamphetamine Psychosis and Schizophrenia. *Psychopathology*. 2016;**49**(6):429–35. [PubMed ID: [27926911](#)]. <https://doi.org/10.1159/000452476>.
- Langeveld J, Bjorkly S, Auestad B, Barder H, Evensen J, Ten Velden Hegelstad W, et al. Treatment and violent behavior in persons with first episode psychosis during a 10-year prospective follow-up study. *Schizophr Res*. 2014;**156**(2-3):272–6. [PubMed ID: [24837683](#)]. <https://doi.org/10.1016/j.schres.2014.04.010>.