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Original article

Methamphetamine use among people who inject heroin in Hanoi, Vietnam

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Abstract: ***Introduction:*** The pattern of drug use in Vietnam has changed rapidly over the past decade, and a large number of people who have a history of heroin injection reportedly use methamphetamine. This paper describes factors associated with methamphetamine use among people who inject heroin in Hanoi, the capital of Vietnam. ***Methods:*** This is a cross-sectional survey among 521 heroin injectors who were recruited through chain referral and outreach at community and clinic settings. Eligibility criteria included: (1) male aged 18 or older; (2) reported heroin injecting during the 12 months before the survey; (3) agreed for a urine test to detect methamphetamine and opiate metabolites. The primary outcome, methamphetamine use, was defined as self-reported methamphetamine use during the 30 days before the survey and/or having a urine test positive for methamphetamine. Structural Equation Model was used to evaluate associated factors for methamphetamine use. ***Results:*** One third of participants qualified as methamphetamine users as defined in this study. A longer history of heroin use (β=0.126, $p<0.001$), using MDMA and/or cannabis (β=0.28, $p<0.001$) and not using condom during sex (β=0.139, $p<0.001$) were positively associated with methamphetamine use. Family functioning (β=-0.141; $p<0.001$) was protective. The goodness-of-fit of Structural Equation Model was excellent (CFI=0.934; TLI=0.912; RMSEA=0.033; WRMR=0.98). ***Conclusions:*** Methamphetamine use among people who inject heroin is a substantial issue in Hanoi. Family functioning has made a critical contribution on reducing methamphetamine use. Future studies should pay attention to address the role of factors at the family level in addition to individual-level factors towards the pattern of drug use.

Keywords: methamphetamine; amphetamine-type stimulant; family functioning; people who inject drugs.

1. INTRODUCTION

More than 80 percent of people who inject drugs (PWID) worldwide are male and mainly inject opioids [1]. Heroin remains the primary illicit drug with an estimated seventy-five percent of the total reported drug users in Vietnam using heroin [2]. In recent years, the number of reported drug users in Vietnam has been rising, mainly due to an increase in the use of amphetamine-type stimulants (ATS) [2]. Simultaneously opioid and stimulant use, particularly methamphetamine use (MA), has been intensifying rapidly and is a major public concern [2–4].

MA use is threating the achievements of HIV prevention programs. MA use leads to numerous HIV risk behaviors [5–7] and a lower uptake of methadone treatment or concurrent heroin use during methadone treatment [5,8]. MA users face not only increased HIV risks but also other health issues. Past evidence showed that MA use is associated with psychiatric health issues such as depression conditions, psychotic disorders, and psychiatric hospital admissions [9,10]. MA use

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also contributed to a substantial percentage of non-fatal overdoses and frequent presentations to emergency departments [10,11]. However, data on the number of MA users in Vietnam are still limited [2].

In the light of threats of concurrent MA and heroin use, identifying the factors associated with MA use among people who inject heroin, both risk and protective factors, is critical to design effective interventions. Past research showed that many socio-demographic characteristics (younger ages, being male, not married, and unemployment) increased the odds of MA use, while some other individual factors such as shorter history of drug use, better perception of MA-related risks led the lower odds [4,12–14]. Those with longer duration of methadone treatment and higher doses of methadone were less likely to use heroin, but not the case with MA [12]. Most existing studies focused on individual characteristics aforementioned while community-level factors were understudied. Moreover, rarer studies considered a conceptual framework of both direct and indirect indicators of MA use.

Family function has been proved to play significant roles in addiction and recovery, particularly among PWID [15,16]. The question is how PWIDs' family contributed to deal with rapid changes in the pattern of drug use that MA is gradually becoming the drug of choice in addition to heroin. Vietnam is a suitable context to investigate this question, not only because MA use is increasing among heroin users in the country [17] but also because Vietnamese's family-oriented culture makes it an ideal site to examine the role of family in MA use [18]. Hanoi is the capital city of Vietnam with the second highest number of injection drug users, yet it witnesses increasing dramatically in the number of ATS users' recent years [2]. For these reasons, we conducted a study to explore the prevalence of MA use among heroin users in Hanoi and to exam a path-way model that considers both direct and indirect factors as well as the aspect of family function.

2. MATERIALS AND METHOD

2.1. Study design

This study is a cross-sectional study involving 521 people who inject heroin in Hanoi in 2014.

2.2. Data collection

To raise the generalization and diversity of participants, we approached potential participants for this study from two sources. Some participants came through referral chains from former participants who had completed the survey. Others came via referring Methadone Maintenance Treatment clinical settings. Potential participants were invited to the study office at Hanoi Medical University to take part in a brief screening which was conducted by a data collection coordinator. The screening included a short list of demographic and behavioral questions and a urine analysis (Multi-Drug One Step Screen Test Panel). Potential drug users were eligible to participate if they were: (1) male aged 18 or older; (2) reported a history of heroin injection in the 12 months before the survey; (3) agreed to a urine test to detect MA and opiate metabolites.

After the participants provided their consent to be part of the study, they were interviewed in person using a structured questionnaire. The interviews took place in a private room and lasted from 50 to 60 minutes. After completing the interview, each participant received 220,000 VND in compensation (equivalent to 10 US dollars) and three coupons to recruit other heroin injectors in his social network to the study. For each successful referral of new eligible participant, the referrer would receive an additional 150,000 VND (equivalent to 7.5 US dollars).

This study was approved by the Hanoi Medical University IRB (number: 144/HMURB on 18th July 2014) and Columbia University Medical Center.

2.3. Measures

Characteristics of substance use was measured by the ASI-Lite Scale which collected frequency of drug use in the past 30 days and lifetime [19]. The primary outcome, MA use status, was categorized as a binary variable, with MA users are those who reported MA use at least one day during the 30 days before the survey by the ASI-Lite Scale or had positive urine tested for MA, and non-users are those who did not have both criteria.

The participants' family function was measured using the Family Function Scale [20], which is comprised two domains: cohesion (5 items) and conflict (5 items). Each item is a Likert scale ranging of points from 1 to 4, where 1 is "Very untrue" to 4 is "Very true". Higher scores reflect greater family functioning. In our dataset, the family functioning scale had a Cronbach alpha of 0.9 showing good internal consistency of the scale.

Mental health measurement was based on a 21-item short version of the Depression-Anxiety-Stress Scale [21]. The scale had been validated in Vietnam [22] which had three domains including: stress, anxiety and depression, with 7 items for each domain representing feeling/emotional statements over the past week. All items ranged from 0 to 3 corresponding with "Not at all" to "Most of the time". The overall scale had a Cronbach alpha of 0.93 in our dataset.

Drug use stigma was measured by a Likert scale consisting of 8 items expressing the participants' self-perception of their own drug use behaviors [23]; each item ranged from 0 to 3 equivalent to "Not at all" to "Very much". Higher scores indicated higher level of drug use stigma. The 8-item scale had a Cronbach alpha of 0.79.

Socio-demographic and other related characteristics considered in the study included age, educational attainment, occupational status, monthly income, marital status, HIV status and current methadone treatment status, number of sexual partners during the past 3 months, condom use during sex, and sharing needles while injecting drugs.

According to our knowledge, except the DASS-21, the remaining scales have not yet to validate in Vietnam. To deal with this limitation, the scales had been forward-backward translated by research team from the Center for Training and Research on Substance Abuse and HIV (Hanoi Medical University) and non-medical professional translators. The scales then had been pre-tested in ten PWID to ensure they understand appropriately regarding questions' content.

2.4. Data analysis

This study is a cross-sectional study involving 521 people who inject heroin in Hanoi in 2014.

3. RESULTS

3.1. Participant characteristics

We recruited 521 people who inject heroin to take part in the study. The average age was 38.1 years (±6.5) with an interquartile range of 33.8 to 42.1 years. The majority of participants were 30 to 40 years old (58.4%); only 7.3% were younger than 29 years old. Approximately 11.7% had educational attainment of less than primary school. About one-fourth currently had no monthly income (23.2%). There was 63.0% of participants who were single or separated/widow. At the time of the study, 35.3% participants were living with HIV (Table 1).

We used the ASI-Lite Scale to explore characteristics of substance abuse during the 30 days before the study (Figure 1). As results, about 90% used heroin during the past 30 days showing that most participants were active heroin users. In the previous 30 days, 41.3%, 5.6% and 4.6% used alcohol, hallucinogens, and cannabis, respectively. MA users, defined as either self-reporting MA use in the past 30 days or a positive urine test for MA, accounted for 33.4% of participants.

Table 1. Characteristics of participants

Characteristics	People who inject heroin (n=521)	
	n	%
Age (Mean, SD)	38.1±6.5	
IQR	33.8 – 42.1	
≤29	38	7.3
30 – <40	304	58.4
≥40	179	34.3
Education		
Primary school and lower	61	11.7
Secondary school	240	46.1
High school or higher	220	42.2
Occupation status		
Employed	400	76.8
Unemployment/students	121	23.2
Monthly income (mean, SD)[a]	5.8±4.8	
IQR	3 – 7	
Marital status		
Married/cohabited with a partner	193	37.0
Single/separated/widow	328	63.0
HIV status		
HIV-positive	184	35.3
HIV-negative	337	64.7
Total years of heroin use (mean, SD)	9.1±5.0	
IQR	6 – 12	
≥ 10 years	282	54.1
< 10 years	239	45.9
Methadone treatment status		
Current treatment (≥1 year)	107	20.5
Current treatment (<1 year)	109	20.9
Not current treatment	305	58.6
Frequency of using condom when had sex during 3 months before survey		
Did not have sex or using condom all of the time when had sex	369	70.8
Most of the time	21	4.1
Some of the time	20	3.8
None of the time	111	21.3
Depression		
Normal/mild	309	59.3
Moderate/severe/extremely severe	212	40.7
Anxiety		
Normal/mild	298	57.2
Moderate/severe/extremely severe	223	42.8
Stress		
Normal/mild	385	73.9
Moderate/severe/extremely severe	136	26.1

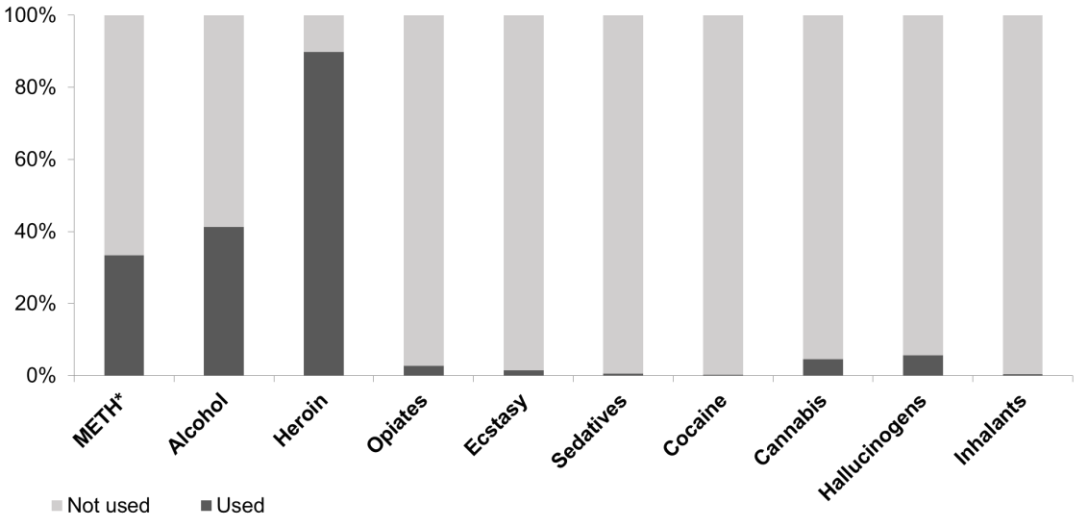

Figure 1. Substance use among people who inject heroin (n=521)
**total numbers of those who self-reported of using METH in the 30 days and/or had positive urine with METH*

Table 2. Confirmatory factor analysis of two constructs for structural equation model

	α[a]	β	CFI	RMSEA
Family functioning	0.85		0.99	0.0
Cohesion	0.83	0.64		
Conflict	0.78	-0.87		
Mental health	0.93		1.0	0.0
Depression	0.87	0.89*		
Anxiety	0.79	0.77*		
Stress	0.85	0.88*		

**p<0,001; aAnalyses were conducted in Stata/MP 14.0; α: Cronbach-α; β: Factor Loading; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation*

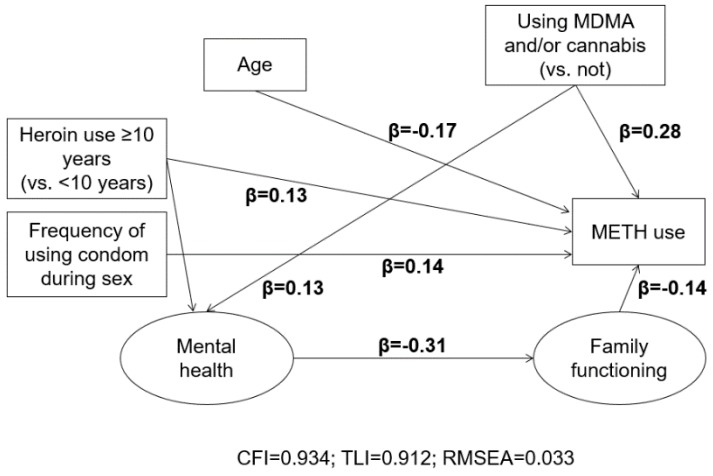

Figure 2. Path coefficients on associated factors with methamphetamine use

3.2. Measure constructs

Table 2 presents statistical indexes of two latent variables which were constructed in the study. Cronbach-α displays the internal consistency of the Likert scales by domain and by overall (valued greater than 0.7). Under the tests of CFA, factor loadings, CFI and RMSEA were showed values in excellence of the goodness of fit for each latent variable (CFI>0.99, RMSEA=0.0 and factor loadings greater than 0.6).

3.3. Structural Equation Model

Figure 2 shows the main findings of the Structural Equation Model. Individual associated factors, participants who were younger (β=-0.169, p<0.001); had longer history of heroin use (β=0.126, p<0.001), used methamphetamine with MDMA and/or cannabis simultaneously (β=0.28, p<0.001) and did not use a condom during sex (β=0.139, p<0.001) existed associated path to methamphetamine use. More than

individual level, family functioning played a protective role towards methamphetamine use (β=-0.141; p<0.001).

Those with a higher score of mental health issues presented a negative impact on family functioning (β=-0.307, p<0.001), which in turn is associated with greater MA use. Monthly income, educational attainment, marital status, and current methadone treatment were not found as significantly associated factors with methamphetamine use in the model. The goodness of fit statistics was excellent (CFI=0.934; TLI=0.912; RMSEA=0.033) (Figure 2). Analysis outputs of the SEM on the Mplus software interface were shown in the Appendix 1 to illustrate the aforementioned findings (Appendix 1).

In a univariate logistic regression model, HIV-positive PWIDs were less likely to use MA compared to HIV-negative. This association was not significant (OR=0.73, 95% CI: 0.5 – 1.1, not shown in Table). The HIV status variable was not included in the SEM.

4. DISCUSSION

The combination of self-reported and a rapid urine test had detected the more sensitive extent of MA use prevalence [30]. Our study presents a higher rate of MA use among people who inject heroin (33.4%) in comparison with previous studies [5,12] which only applied a urine test for MA use. Percentage of MA use was identified through a urine test that fluctuated in a range of 23 to 25 percent [5,12]. A rapid urine test such as ABON is capable of detecting drug use up to 7 days before the test, the number of active MA users might therefore be considerably underestimated in many parts of the world. In Vietnam, recent reports showed the relentless increase of ATS use, especially MA, has been reshaping the pattern of drug use. The measurement of MA use in particular should be more explicit over the regions to design and speed up effective interventions against this rapid change.

MA and polydrug use have been highlighted in numerous studies over the past decade [31] but impacts of the pattern of polydrug use on MA use needs further clarification. Studies showed that not only heroin/opiate use a related factor with initial MA use [32], other substances are also risk factors [30]. Both the usages of cocaine and hallucinogen are associated positively with MA use [9,14]. Although our samples presented a considerable rate of polydrug use which comprised a variety of drugs such as alcohol, heroin, MA, hallucinogens, cannabis and ecstasy; only MDMA and/or cannabis use was shown as a positive related factor to MA use.

Whereas correlation between familial contexts and substance abuse has been indicated in prior studies [3], which studies focused on family-level impacts on eliminating MA use among heroin users was still rare, particularly in Vietnam. Familial contexts that influenced the more frequent use of MA among adolescents or PWID included homelessness, parent(s) with alcohol or drug problems, cohabiting with a person who abuses alcohol or drugs, absence of a family confidant [3,14,30,33]. Little was interested in the family functioning and how it related to MA use among PWID. This study revealed that cohesion and conflict interactions, which reflected family functioning, were inversely associated with MA use. It is an important note in terms of the role of interactions within the family environment against MA use, the more cohesive family environment, the less use of MA in heroin users.

In the structural equation model, the construct of mental health was an important mediator to the outcome. A poor mental health condition of heroin users on the whole reduced family functioning, which turn into raising MA use in their own. Two remarkable indicators related to the mental health impairment including longer duration of heroin use and concurrent MDMA and/or cannabis use. As shown above, MDMA and/or cannabis use not only directly influenced MA use, but also affected indirectly through mental health. In contrast, depression and psychiatric conditions have been influenced by ATS use as well as MA in particular [9,10,34]. As such, the downward spiral of polydrug use including MA use and mental health conditions has been shown the need of more effective interventions targeting PWID in which family factors may play a critical role.

Our study has some limitations of interest. First, the cross-sectional study could not ascertain an interfere relationship between covariates with MA use. Secondly, our study only focused on males who inject heroin, thus it could not determine the role of sex/gender and gender-related aspects towards MA use. Despite these limitations, our sample was recruited via both referral chain and MMT clinical settings, with about half of participants currently on methadone treatment, our study therefore might have a broader generalization for people who inject heroin. Besides, this study provided a preliminary model of MA use among heroin injectors in Hanoi, a typical metropolitan in Vietnam, as well as suggested the important roles of family factors in similar settings within other Vietnamese cities.

Conclusion

This study indicated the importance of intensive comprehension of modeling influencing MA use which consists of not only individual direct factors but also familial indirect aspects. We found poor mental health conditions and longer history of heroin use as well as current use MDMA and/or cannabis were independently associated with the higher likelihood of MA use. In contrast, the more cohesive interactions within family functioning have made a significant contribution on decreasing MA use among PWID. Furthermore, family functioning has also considered being a promising factor to interrupt the spiral of polydrug use and mental health among PWID. In conclusion, the role of family functioning and preliminary results from our comprehensive model suggested the need of multifaceted interventions in the future with the center of family-level factors.

LIST OF ABBREVIATIONS

MA: methamphetamine, PWID: people who inject drugs, ATS: amphetamine-type stimulants, VND: Vietnam Dong, ASI-Lite Scale: Addiction Severity Index-Lite Scale, DASS-21: Depression-Anxiety-Stress Scale 21-item version, CFA: Confirmatory Factor Analysis, SEM: Structural Equation Model, CFI: Comparative Fit Index, TLI: Tucker-Lewis Index, RMSEA: Root Mean Squared Error Approximation, MDMA: 3,4-methylenedioxymethamphetamine, MMT: methadone maintenance treatment.

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AUTHORS' CONTRIBUTIONS

TTDD performed the data analysis and drafted the manuscript; GML designed the outline of introduction, and provided critical revisions. TTN contributed to result interpretation, provided suggestions on introduction and discussion and edited language style. DF, GML and TMN conceptualized the study. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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