



Research paper

A qualitative inquiry into methadone maintenance treatment for opioid-dependent prisoners in Tehran, Iran

Saman Zamani^{a,*}, Marziyeh Farnia^b, Saman Tavakoli^c, Mehran Gholizadeh^d, Mohammad Nazari^d, Ali-Akbar Seddighi^d, Hamidreza Setayesh^e, Parviz Afshar^f, Masahiro Kihara^a

^a Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan

^b Headquarter for Health and Treatment, Iran Prison Organization, Tehran, Iran

^c Shahid Beheshti University of Medical Sciences and Health Services, Tehran, Iran

^d Ghezel Hesar Prison, Karaj, Tehran Province, Iran

^e UNAIDS Regional Office, Cairo, Egypt

^f Ministry of Social Welfare, Tehran, Iran

ARTICLE INFO

Article history:

Received 23 January 2009

Received in revised form 6 March 2009

Accepted 9 March 2009

Keywords:

Prison
Methadone maintenance treatment
Drug use
Iran

ABSTRACT

Background: This study aimed to investigate the context in which methadone maintenance treatment (MMT) is provided for opioid-dependent prisoners, and to identify barriers against further scale-up of MMT in Ghezel Hesar prison in Tehran.

Methods: This was a cross-sectional qualitative study using field observations, focus group discussions, and individual interviews. In total, 30 prisoners and 15 prison staff and health policymakers participated in this study in November 2006.

Results: The rate of drug injecting in the prison unit was unanimously reported to have decreased drastically since introducing the MMT program. In addition to the health benefits to MMT recipients, interview data indicates that MMT has had positive effects on socio-economic status of prisoners' families. Nevertheless, several impediments to the provision of MMT services and to its further expansion were also identified, including staff shortages, some degree of methadone diversion, widespread concerns over the possible side effects of methadone, and the stigma attached to methadone treatment.

Conclusion: MMT constitutes one of the main components of the Iran Prison Organization's comprehensive HIV prevention package and is becoming increasingly accessible to opioid-dependent prisoners in Iran. Our findings indicate that the MMT program in Ghezel Hesar prison has been helpful for many opioid-dependent prisoners to reduce their risk of drug-related harm and to ease social and financial burden over their families. Meanwhile, existing barriers against provision of MMT should be properly addressed before further scale up of the program.

© 2009 Elsevier B.V. All rights reserved.

Introduction

There is solid research evidence indicating that prisoners experience high potential exposure to HIV infection in the prison environment, especially those who use drugs by injection (Beyrer et al., 2003; Macalino et al., 2004; Stark, Bienzle, Vonk, & Guggenmoos-Holzmann, 1997; Vanichseni et al., 2001), and there have been reports on HIV outbreaks among drug-injecting prisoners (Dolan & Wodak, 1999; Taylor et al., 1995). It is also known that HIV outbreaks have occurred inside prisons in Iran in the mid-1990s

(UNAIDS, 2006). Studies have reported on the risk of HIV transmission in association with shared drug injection in Iranian prisons (Razzaghi & Rahimi, 2005; Razzaghi, Rahimi, Hoseini, Madani, & Mohammad, 2000) and that sharing drug-injecting tools inside prisons was the main correlate of HIV infection among community samples of injecting drug users (IDUs) in Tehran (Zamani et al., 2005, 2006).

As a way of confronting the challenges associated with the transmission of blood-borne infections, particularly HIV infection, among IDUs and prisoners, authorities in Iran's Prison Organization have implemented comprehensive harm reduction practices for drug-using prisoners, including methadone maintenance treatment (MMT) (Farnia & Afshar, 2006; Zamani et al., 2007) and initiatives toward developing needle and syringe programs. Substitution maintenance treatment with methadone, a synthetic full opioid agonist, is a well-researched intervention that is effective in reducing or stopping drug injecting, resulting in an overall

* Corresponding author at: Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Yoshida-Konoe-cho, Sakyo-ku, Kyoto 606-8501, Japan. Tel.: +81 75 753 4350; fax: +81 75 753 4359.

E-mail addresses: szamani@pbh.med.kyoto-u.ac.jp, saman.zamani@gmail.com (S. Zamani).

reduction in sharing practices among drug-using people (Dolan et al., 2003; Farrel, Gowing, Marsden, Ling, & Ali, 2005; Gossop, Marsden, Stewart, & Treacy, 2001; Tomasino, Swanson, Nolan, & Shuman, 2001). MMT can also prevent deaths due to overdose and reduce opioid use and re-incarceration (Dolan et al., 2005; WHO/UNODC/UNAIDS, 2004).

Although only a few countries in the Middle East provide opioid substitution treatment in prison (Larney & Dolan, 2009), Iran has been progressively expanding its programs in correctional settings. The number of opioid-dependent prisoners receiving MMT inside prisons has increased continuously since the initiative began with 100 prisoners in 2002. At time of investigation (late-2006), out of 230 prisons and correctional settings in Iran, 54 have been providing MMT to over 4200 opioid-dependent prisoners inside prisons (Farnia & Afshar, 2006). However, there was little research-based evidence on the context of MMT provision in a prison in Iran. This study aimed to investigate the context in which MMT is provided for opioid-dependent prisoners, potential impacts on the health status of the prisoners, as well as to identify some of the barriers against further scale-up of MMT in Ghezel Hesar prison in Tehran. The results of this qualitative study are intended to improve the provision of MMT in Ghezel Hesar prison and might also benefit other prisons planning to initiate or improve MMT programs.

Method

Design and sampling methods

The study protocol stipulates evaluation of MMT program in Ghezel Hesar prison through a longitudinal study incorporating both qualitative and quantitative methodologies. This paper represents the qualitative phase of the evaluation using a triangular design that sought multiple sources of information including interviews and discussions with drug-using prisoners, prison authorities and health care providers in Ghezel Hesar prison, and government health policymakers.

Participants were recruited through purposive sampling and included incarcerated drug users, prison authorities, and care providers who might offer different views on the provision and utilisation of MMT in Ghezel Hesar prison. Potential participants were approached and recruited with the help of prison medical staff, but the research team supervised the screening of eligible respondents.

Data collection

Several sources and methods were used for data collection including secondary analysis of reports made available from Ghezel Hesar prison and Iran Prison Organization, ethnographic observation of the health facilities in the prison and the administration of MMT to the prisoners, and in-depth interviews and focus group discussions with MMT providers and receivers, prison authorities and health policymakers.

To conduct focus group discussions among incarcerated drug users, a private room was made available in Ghezel Hesar prison. All interviews were conducted in Farsi, the official language in Iran. The specific topics of interest were introduced using an interview guide based on the research themes. Each participant was given refreshments during the discussions, but no monetary incentive was given. Prison staff and health policymakers were interviewed at either the Health Department of Ghezel Hesar prison or their offices. Most of the interviews were audio-recorded but, in a few cases, health policymakers answered several open-ended questions and their answers were documented by hand written notes.

In all, 30 prisoners, including three assistants for MMT administration, participated in seven focus group discussions conducted

inside Ghezel Hesar prison in November 2006. In addition to prisoners, 15 other people, including four physicians, two nurses, three psychologists, two prison managers and four health policymakers were interviewed.

Data analysis

All tape-recorded data were transcribed anonymously. Data analysis began after the first interview was completed in order to refine the research questions using the constant comparative method (Pope, Ziebland, & Mays, 2001). The analysis of this research was based on constructing a thematic framework (Ritchie, Spencer, & O'Connor, 2004), which was used to classify and organize data according to key themes: concepts and emergent categories. The process of interpretation was affected by the original research objectives, as well as by the themes that emerged from the data.

Ethical considerations

The study protocol was reviewed by the ethics committee of the Iran Prison Organization and, after incorporating the comments from the committee, permission was obtained from the Organization for the study. Participants' personal identification was not required, and interviews were carried out in an environment that could provide personal privacy and confidentiality as was possible. Refusal to participate in this study was intended to not interfere with the health care and treatment of participants. Respondents were informed about the aim and purpose of the study, the voluntary nature of their participation in the interviews, and the anonymity of all collected data before providing verbal informed consent for participation.

Setting

Ghezel Hesar prison, located in Karaj District near Tehran, is one of the 6 prisons in Tehran Province and the largest of the 230 prisons and correctional facilities in Iran. Ghezel Hesar incarcerates an estimated 11,000 male prisoners at any time, but the numbers fluctuate between 10,000 and 13,000. The majority of the prisoners have been convicted of drug-related offences. The Prison Organization reported that in 2007 there were about 147,000 prisoners in Iran, with Ghezel Hesar prison includes about 7–9% of all incarcerated people. Approximately 250–300 people enter and leave this facility every day. A large compound, Ghezel Hesar includes several units divided according to the crimes of the inmates.

MMT program in Ghezel Hesar prison

The MMT program was started in Ghezel Hesar prison in 2002 as a pilot study involving 50 participants. The pilot program showed promising results in terms of reducing high-risk behaviours (Bayanzadeh & Afshar, 2004; Bolhari et al., 2002). After evaluation of feasibility and benefits, the MMT program expanded to include increasing numbers of opioid-dependent inmates. At the time of data collection, 968 prisoners in Ghezel Hesar prison were receiving MMT from the health staff, with an additional 100 others or so had started MMT inside the prison, but were released when their sentences were completed.

Through the course of the MMT program, eligibility criteria expanded from status as an HIV positive IDU at the beginning of the program to status as an IDU, and currently consist of status as an opioid-dependent prisoner at risk for HIV according to a general practitioner. However, opioid-dependent prisoners with HIV-positive and IDU status are still prioritized in order to reduce their waiting time for entrance into the MMT program.

An initial induction dose of methadone is decided by a physician after clinical assessment of an opioid-dependent prisoner. In the

maintenance phase, the methadone syrup is administered by the help of a health assistant under supervision of a nurse.

Results

This section describes the characteristics of the sample, the context of drug use in Ghezel Hesar prison, and how the MMT program has impacted patterns of drug use, the health status of drug-using prisoners, and the social wellbeing of the families of prisoners. Lastly, obstacles against the provision of MMT in this prison are explained.

The 30 prisoners who participated in this study were male, with a median age of 38.0 years. Most of them were married but less than one-fifth had never been married at the time of the study. The participants had diverse educational backgrounds but half were educated up to the junior high school level. All of the participants, except 1 young participant, had a job or profession before entering Ghezel Hesar. The median length of the participants' incarceration in this prison was 27.0 months. Excluding 4 participants with life sentences, the median length of the remaining term was 19 months. One-third of the participants had been on MMT for a median length of 5.5 months at the time of the study.

Access to and use of illicit drugs by prisoners

The prison unit (Unit No. 1) in which this study was conducted, the general perception was that different kinds of drugs were available, with the most available drug being called "crack" (apparently high-grade crystal heroin that has been marketed in Iran for a few years). The respondents reported that drugs were generally more accessible inside prison than in the outside community. While the quality of drugs obtained in the prison was considered the same as that of drugs marketed outside the prison, the price of drugs inside prison was reported to be high, between 5 and 8 times more expensive than outside. While the high price of drugs inside prison may result in less frequent use among underprivileged prisoners, it might increase the likelihood that they will shift to injecting drugs as the most cost-efficient way to use.

Prisoner: When [a prisoner] wants to use a tiny amount of Heroin or crack [crack Heroin] which has recently become available in the prison, he cannot afford to buy enough to smoke it. Therefore, he pours it in a spoon and boils it and aspirates it into a pump [a hand-assembled injecting device] along with 2–3 other people and injects it into his vein. He thinks this will keep him right for about 10 h. It is not like this outside [of prison].

Perceived impacts of MMT on the rate of drug injection in the prison

One of the most striking changes in the pattern of drug use after the introduction of the MMT program was the overall reduction in injecting drug use in Unit No. 1 of Ghezel Hesar prison. This reduction in the rate of drug injection was reported by all study participants, including non-recipients of MMT, prison authorities and health policymakers.

Prisoner 1: Since this methadone program has started; I know 20–30 of my acquaintances who were injecting and in very bad shape. But since methadone has come, they have abandoned [injecting]. . . We had a block here called the "Pumping Block" [where many people used to inject drugs with hand-assembled devices called pump]! We don't have a block with that label anymore. When we used to enter that Block, there were small fires and injecting materials. Since the methadone program has

started, I have not seen any of this. Although people say that there are still some people injecting, I have not seen any.

The general impact of MMT on drug injection has also been reported on by the managing staff:

When any of the cell blocks were visited, there were significant numbers of people who were injecting; they were injecting with different tools and equipment, mainly handmade, and this was widespread in all the cell blocks of Unit No. 1. . . Implementation of this program [MMT program] has meant that we do not see injecting tools to the same extent anymore; I can't say there aren't any at all, but their use has been reduced significantly; we have treated over 90% [of the drug injectors] with methadone.

Perceived impacts of MMT on the health of drug-using prisoners

Both opioid-dependent prisoners who were receiving MMT and practitioners in Ghezel Hesar prison reported that MMT had several health benefits for opioid-dependent prisoners. Methadone maintenance has reportedly contributed to improved physical and mental health of the recipients.

Prisoner: Now, my view of life has changed and I see the world as more beautiful. It was not like this before; I wanted to die before, but not now! Now I want to live my life; now I want to complete my sentence and go back to my child; perhaps I can convince his mother to live with me again. This is the effect methadone has had on me; I've become very positive!

As mentioned earlier, MMT reportedly had a great impact in reducing drug injection and sharing practices among drug injecting individuals receiving MMT inside Ghezel Hesar prison.

Prisoner: I was an injector outside and after entering [this prison]; I was an "injector"! Now I have been in the methadone program for 6–7 months, and I have abandoned [injection]! I don't do it anymore. It is true that I have lost my life; I have lost everything, but I am happy that I have stopped injecting and that I am taking methadone.

Perceived impacts of MMT on the socio-economic status of prisoners' families

Prisoners have to spend more of their money, which comes mainly from their families, to buy drugs and it is common that they demand yet more money from their families and this can impose a great financial burden on their family. The drug-using prisoners urge their family to give them more money to cover the extremely high cost of drugs inside prison.

Prisoner: I'm talking about myself; during the seven years I have been in this prison, my wife and kids have not spent as much money as I have in paying for drugs! Sometimes I call them for money and they reply, "For the 50,000 [toomans] you take, we only spend 10,000! [toomans] What are you doing in there?" Then, I have to lie to them! I don't say that I am spending it on drugs; I say that there is no bread here, and I have to buy three loaves of bread for 10,000 toomans! I buy one canned fish for 5,000 toomans! I get the money for these.

Financial support from families to cover drug use-related expenses may not be feasible for many, especially for underprivileged families and those families for whom release of their incarcerated family member is some time away. This may contribute

to other social issues, such as putting marriages under pressure, which may lead to divorce.

Prisoner 1: Some guys beg; some get angry with their families in order to get money for drugs!

Prisoner 2: I saw a guy talking with his wife over the phone telling her, "I don't care how you do it, just go and get this money!"

Prisoner 1: I apologize for my rudeness, but you can understand what this means!

Prisoner 3: In my opinion, some families have ended in divorce because of these problems; they have abandoned him because they didn't have [money] to remit after they saw that he was addicted!

However, there were many accounts of how MMT had alleviated the financial strain on drug-using prisoners and on their families. Previous opioid-dependent prisoners who have received MMT do not need to ask their families to remit money now. The heavy financial burden on such prisoners' families has been lifted, thus helping to avoid a number of social consequences.

Prisoner: It [MMT program] has resulted in so many changes; because of my addiction, I used to force my family to visit me every week by telling them I was in debt! But now I am taking methadone and when they call me, I ask only about how they are doing! My family is aware that something has happened and they say, "Hey, you used to ask for money all the time, but not anymore".

Obstacles to the provision of MMT in the prison

Although the authorities of Ghezel Hesar prison have succeeded in implementing the MMT program and scaling it up to cover about 1000 opioid-dependent prisoners, they have not had an easy start to the program. Even now, they face several challenges that need to be overcome in order to continue the program in the prison. The following, although not exhaustive, are among the most commonly expressed challenges to implementing and scaling up the MMT in Ghezel Hesar prison.

Shortage of health staff

One of the main challenges to providing the MMT program inside Ghezel Hesar prison is the shortage of health staff. The importance of this shortage may be highlighted by considering that about 1000 prisoners have already received MMT, but that there are hundreds on a waiting list to receive it. There is strong demand from the prison health policymakers to increase the coverage of MMT for drug-using prisoners, but this, in turn, might be in conflict with the quality of care that the Health Bureau aims to provide for drug users in the prison. The shortage of personnel is not confined to nurses who supervise the methadone intake of the prisoners; it also affects the provision of psychological care to the prisoners who receive MMT.

Diversion of methadone

The MMT program started in Ghezel Hesar prison as a research-based program involving considerable supervision of the therapeutic use of methadone by registered prisoners. However, the rapid expansion of the program to include increasing numbers of eligible drug-using prisoners in the context of limited personnel has resulted in greater laxity with regard to the supervision of methadone use.

Consequently, several accounts from different sources have indicated that methadone diversion occurs to some extent:

Prisoner: When a guy goes to take methadone, he may skip taking it completely. Well, the Doctor cannot [supervise properly]; how can he check whether all 500 people have taken [their methadone]!

Diversion of methadone was actually observed in the ethnographic part of the study on how methadone has been provided to the opioid-dependent prisoners. It has also been recognizable by the prison managers and health personnel.

Prison staff: We really want to ensure that the supervisory mechanism prevents diversion, but we know that there are some prisoners who might be under financial strain and, although they take [methadone] in front of a nurse, when he leaves, the prisoner can spit it out and then sell it or exchange it for a cigarette. Such cases have been reported.

Prevalent concerns over the side effects of methadone

Although the side effects of MMT reported by those receiving the treatment do not seem to be major problems, they have caused serious concern for both prisoners under treatment and those who are on a waiting list to receive MMT. The level of concern regarding side effects of methadone was much higher among those drug-using prisoners who have not yet received MMT, but are registered to be treated with MMT.

Prisoner 1: Doctor, there are several rumours about methadone; some people say it damages the liver. Many people are still afraid of that.

Prisoner 2: Many people are afraid to take that [methadone].

Prisoner 3: But these stories involve people outside our Unit [where MMT is available]; and they say that they have heard this from doctors in the Health Department, but I don't believe them.

Prisoner 1: Some people are really scared about the side effects of methadone!

Stigma attributed to be under treatment with methadone

There were several accounts from prisoners receiving MMT that other prisoners or even prison staff stigmatizes those receiving MMT. This stigma might be attributed to the original inclusion criteria for receiving MMT, i.e., being HIV infected and subsequently being either HIV infected or an injecting drug user, many of whom are financially unprivileged. There were some additional accounts implying that the stigma against MMT might be attributed to the special attention paid to young prisoners who have been selling sex for drugs in Ghezel Hesar prison.

Prisoner 1: There is another issue concerning methadone; other people view us differently.

Facilitator: What do you mean by view differently?

Prisoner 2: For example, fellows think that [people receiving MMT] are extremely poor or, I apologize for saying this, are lasshi [here, an offensive expression of being homosexual]! Or sick, Methadone is viewed negatively now. Those who are not taking methadone think that those who are receiving methadone either have AIDS or, I apologize for saying this, have become

lasshi and cannot afford to buy drugs, so they had to participate in the methadone program.

After-care

Because many drug-using prisoners have been treated by the MMT program in Ghezel Hesar prison, concern about the aftercare of these patients has been increasing among both prisoners and health policymakers. Aftercare constitutes a substantial problem because no referral system exists and inmates are simply informed about MMT centres in the community. Moreover, MMT services are not available throughout Iran, rendering geographic distance, overcrowded programs, and long waiting lists major obstacles to continued treatment upon release.

Discussion

MTT constitutes one of the main components of the Iran Prison Organization's comprehensive HIV prevention package and is becoming increasingly accessible to opioid-dependent prisoners in Iran; however, there was little research-based evidence on the context of this treatment inside prisons. In this study, we explored the current provision of MMT in Ghezel Hesar prison, Iran, and investigated its potential impact on drug-related risk behaviours and the well-being of prisoners' families. Our findings indicate that the MMT program in Ghezel Hesar prison has been successful in helping many drug-using inmates reduce their risk of drug-related harm. Our findings also indicate that the MMT program has effects beyond those on the direct recipients of methadone because it also benefits the social wellbeing of families of MMT recipients.

Recent bio-behavioural studies conducted among visitors to drug-treatment facilities and those in a community-based setting in Tehran found that HIV-1 infection was associated with a history of shared drug injection while in prison and with multiple incarcerations (Zamani et al., 2005, 2006). Other studies have also documented the risk of HIV transmission associated with shared drug injection in Iranian prisons (Razzaghi & Rahimi, 2005). As a high risk of HIV transmission occurs through shared drug injection inside prison, the significant reduction in the amount of drug injection, and thus needle sharing, MMT program is of great importance in preventing HIV infection in Ghezel Hesar prison.

Our qualitative findings indicate that after introduction of the MMT program in Ghezel Hesar prison, the rates of drug injection and consequently of sharing needles have reportedly been reduced to very low levels among both recipients and non-recipients of MMT in the study unit. Thereby, the MMT program can potentially reduce drug use and drug injection by inmates in Ghezel Hesar prison, a finding that concurs with evidence from other countries (Dolan et al., 2003, 2005; Gossop et al., 2001; Tomasino et al., 2001). Consequently, it is very important that comprehensive HIV prevention measures, including MMT, become widely available for drug-using prisoners to best control the epidemic among injection drug users and prevent further transmission of the infection to broader populations.

To our knowledge, our study is among the first to reveal a possible impact of the MMT program on the social and economic well-being of the families of the prisoners. The participants unanimously reported that MMT has helped ease the financial burden on their families, as they no longer need to give money to the prisoners to buy illicit drugs, which are particularly expensive inside prison. This in turn may have helped prisoners maintain ties with their families by eliminating such financial problems.

Our findings indicate that at the time of the study, several barriers existed to the provision of quality MMT and scale-up of this prevention intervention in Ghezel Hesar prison. The shortage of

qualified personnel seems to be a real impediment to the controlled administration of methadone in the prison. This shortage of health personnel is mirrored in some deficiencies, including some degrees of methadone diversion in the prison unit. Although the level of dedication and commitment of the health personnel and other people currently involving in providing MMT in Ghezel Hesar prison is very high, any plan for further scale-up MMT in this prison must find a way to deal with the shortage of qualified health personnel as the first priority.

Although the health care staffs seem non-judgemental toward drug-using inmates, including IDUs and MMT recipients, the fact that MMT commenced with the most disadvantaged prisoners has unintentionally stigmatized the inmates in the MMT program. This might pose an obstacle to scaling up the process. Although it sounds paradoxical, this problem might be solved after expanding the program to other units with more neutral reputations in terms of the types of prisoner incarcerated.

The high levels of concern among drug-using prisoners over the potential side effects of methadone were much more intense than expected. Unless a well-targeted educational program regarding the overall safety of methadone for long-term use is developed, these concerns, which might have been intensified by drug dealers in Ghezel Hesar prison, may affect the acceptability of MMT to a substantial degree.

Many of these misconceptions could be corrected through sufficient information provision and education by the health care staff of the prison. Some limitations to this study should be noted. This qualitative study did not seek to produce generalizable findings, but rather to offer variety of observations about the provision of MMT and its utilisation by incarcerated drug users. Although the research team and prison health staff made substantial efforts to help participants feel comfortable and share their thoughts and experiences in focus group discussions, socially desirability in responding remains a potential source of bias in research involving inmates in a punitive setting. In addition, some important issues as the compliance of opioid-users with the MMT program, the details of methadone diversion, and impact of methadone on sexual health of opioid-dependent prisoners await future research.

In conclusion, our findings suggest that access to MMT is helpful for improving the physical and psychological health of the recipients. In particular, MMT is perceived as being effective in reducing illicit drug injection in a prison setting and can be considered an important intervention for preventing the transmission of blood-borne infections among inmates. MMT also had a promising impact on the financial and social well-being of prisoners' families by easing the financial strain placed on both the families and opioid-dependent prisoners before receiving MMT. It is recommended that comprehensive prevention measures, including a MMT program, are made available to incarcerated drug users and these programs be better coordinated with those available in the outside community.

Acknowledgments

We greatly acknowledge the participants and the staff of Ghezel Hesar prison. The contributions of Gelareh Mostashari, Behnam Farhoudi, Bahman Ebrahimi, Padideh Faeghi, and Nazanin Rabei were appreciated. This study was supported by a grant from the UNODC—Country Office for the I.R. of Iran.

Conflict of interest statement

None.

References

- Bayanzadeh, S. A., & Afshar, P. (2004). *A study of effectiveness of pharmacological and psychological interventions in reducing drug related harms and improving psychological status of drug dependent prisoners*. Tehran: Tehran Psychiatric Institute, Iran Prison Organization, and United Nations Office on Drugs and Crime, Iran. (in Persian).
- Beyrer, C., Jittiwutikarn, J., Teokul, W., Razak, M. H., Suriyanon, V., Striak, N., et al. (2003). Drug use, increasing incarceration rates, and prison-associated HIV risks in Thailand. *AIDS and Behavior*, 7(2), 153–161.
- Bolhari, J., Alvandi, M., Afshar, P., Bayanzadeh, A., Rezaii, M., & Rahimi Movaghar, A. (2002). *Assessment of drug abuse in Iranian prisons*. Tehran: United Nations Drug Control Programme (UNDCP), Iran and Drug Control Headquarters (DCHQ) in Iran. (in Persian).
- Dolan, K. A., & Wodak, A. (1999). HIV transmission in a prison system in an Australian state. *The Medical Journal of Australia*, 171(1), 14–17.
- Dolan, K. A., Shearer, J., MacDonald, M., Mattick, R. P., Hall, W., & Wodak, A. D. (2003). A randomised controlled trial of methadone maintenance treatment versus wait list control in an Australian prison system. *Drug and Alcohol Dependence*, 72(1), 59–65.
- Dolan, K. A., Shearer, J., White, B., Zhou, J., Kaldor, J., & Wodak, A. D. (2005). Four-year follow-up of imprisoned male heroin users and methadone treatment: mortality, re-incarceration and hepatitis C infection. *Addiction*, 100(6), 820–828.
- Farnia, M., & Afshar, P. (2006). *An overview on HIV/AIDS in prisons of Islamic Republic of Iran*. Tehran: Health and Treatment Headquarter, Iran Prison Organization. (in Persian).
- Farrel, M., Gowing, L., Marsden, J., Ling, W., & Ali, R. (2005). Effectiveness of drug dependence treatment in HIV prevention. *International Journal of Drug Policy*, 16(5), 67–75.
- Gossop, M., Marsden, J., Stewart, D., & Treacy, S. (2001). Outcomes after methadone maintenance and methadone reduction treatments: Two-year follow-up results from the National Treatment Outcome Research Study. *Drug and Alcohol Dependence*, 62(3), 255–264.
- Larney, S., & Dolan, K. (2009). A literature review of international implementation of opioid substitution treatment in prisons: Equivalence of care? *European Addiction Research*, 15(2), 107–112.
- Macalino, G. E., Vlahov, D., Sanford-Colby, S., Patel, S., Sabin, K., Salas, C., et al. (2004). Prevalence and incidence of HIV, hepatitis B virus, and hepatitis C virus infections among males in Rhode Island prisons. *American Journal of Public Health*, 94(7), 1218–1223.
- Pope, C., Ziebland, S., & Mays, N. (2001). Analysing qualitative data. In C. Pope & N. Mays (Eds.), *Qualitative research in health care* (pp. 75–88). London: BMJ Books.
- Razzaghi, E. M., & Rahimi, M. A. (2005). *Injection drug use in Tehran*. Iran: Tehran University of Medical Sciences.
- Razzaghi, E. M., Rahimi, M. A., Hoseini, M., Madani, S., & Mohammad, K. (2000). *Rapid assessment of drug misuse in Tehran, Iran*. Iran: Iranian Welfare Organization.
- Ritchie, J., Spencer, L., & O'Connor, W. (2004). Carrying out qualitative analysis. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 219–262). London: SAGE Publications Ltd.
- Stark, K., Bienzle, U., Vonk, R., & Guggenmoos-Holzmann, I. (1997). History of syringe sharing in prison and risk of hepatitis B virus, hepatitis C virus, and human immunodeficiency virus infection among injecting drug users in Berlin. *International Journal of Epidemiology*, 26(6), 1359–1366.
- Taylor, A., Goldberg, D., Emslie, J., Wrench, J., Gruer, L., Cameron, S., et al. (1995). Outbreak of HIV infection in a Scottish prison. *British Medical Journal*, 310(6975), 289–292.
- Tomasino, V., Swanson, A. J., Nolan, J., & Shuman, H. I. (2001). The key extended entry program (KEEP): A methadone treatment program for opiate-dependent inmates. *The Mount Sinai Journal of Medicine*, 68(1), 14–20.
- UNAIDS. (2006). *Islamic Republic of Iran Country report on monitoring of the United Nations general assembly special session on HIV and AIDS declaration of commitment*. Office of the Under-secretary for Health, Ministry of Health and Medical Education, Centre for Diseases Management. Retrieved March 3, 2009, from <http://data.unaids.org/pub/Report/2006/2006.country.progress.report..iran.en.pdf?preview=true>.
- Vanichseni, S., Kitayaporn, D., Mastro, T. D., Mock, P. A., Raktham, S., Des Jarlais, D. C., et al. (2001). Continued high HIV-1 incidence in a vaccine trial preparatory cohort of injection drug users in Bangkok, Thailand. *AIDS*, 15(3), 397–405.
- WHO/UNODC/UNAIDS. (2004). *Substitution maintenance treatment in the management of opioid dependence and HIV/AIDS prevention: Position paper*. Geneva: World Health Organization, United Nations Office on Drugs and Crime, Joint United Nations Programme on HIV/AIDS.
- Zamani, S., Kihara, M., Gouya, M. M., Vazirian, M., Ono-Kihara, M., Razzaghi, E. M., et al. (2005). Prevalence of and factors associated with HIV-1 infection among drug users visiting treatment centers in Tehran, Iran. *AIDS*, 19(7), 709–716.
- Zamani, S., Kihara, M., Gouya, M. M., Vazirian, M., Nassirimanesh, B., Ono-Kihara, M., et al. (2006). High prevalence of HIV infection associated with incarceration among community-based injecting drug users in Tehran, Iran. *Journal of Acquired Immune Deficiency Syndromes*, 42(3), 342–346.
- Zamani, S., Ichikawa, S., Nassirimanesh, B., Vazirian, M., Ichikawa, K., Gouya, M. M., et al. (2007). Prevalence and correlates of hepatitis C virus infection among injecting drug users in Tehran. *International Journal of Drug Policy*, 18(5), 359–363.

Research article

Open Access

Methamphetamine use and correlates in two villages of the highland ethnic Karen minority in northern Thailand: a cross sectional study

Eiko Kobori*¹, Surasing Visrutaratna², Yuko Maeda³, Siriporn Wongchai², Akiko Kada⁴, Masako Ono-Kihara¹, Yoko Hayami⁵ and Masahiro Kihara¹

Address: ¹Department of Global Health and Socio-Epidemiology, Kyoto University School of Public Health, Kyoto, Japan, ²Chiang Mai Provincial Health Office, Chiang Mai, Thailand, ³School of Human Health Science, Kyoto University Graduate School of Medicine, Kyoto, Japan, ⁴Department of Clinical Research and Development, National Cardiovascular Center, Osaka, Japan and ⁵Center for Southeast Asian Studies, Kyoto University, Kyoto, Japan

Email: Eiko Kobori* - kobori.e@kw8.ecs.kyoto-u.ac.jp; Surasing Visrutaratna - surasing@loxinfo.co.th; Yuko Maeda - maeda@hs.med.kyoto-u.ac.jp; Siriporn Wongchai - siripom_cm@hotmail.com; Akiko Kada - kada@hsp.ncvc.go.jp; Masako Ono-Kihara - okmasako@pbh.med.kyoto-u.ac.jp; Yoko Hayami - yhayami@cseas.kyoto-u.ac.jp; Masahiro Kihara - poghse@pbh.med.kyoto-u.ac.jp

* Corresponding author

Published: 15 May 2009

Received: 19 November 2008

BMC International Health and Human Rights 2009, 9:11 doi:10.1186/1472-698X-9-11

Accepted: 15 May 2009

This article is available from: <http://www.biomedcentral.com/1472-698X/9/11>

© 2009 Kobori et al; licensee BioMed Central Ltd.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract

Background: The prevalence of methamphetamine use and human immunodeficiency virus (HIV) incidence are high in lowland Thai society. Despite increasing social and cultural mixing among residents of highland and lowland Thai societies, however, little is known about methamphetamine use among ethnic minority villagers in the highlands.

Methods: A cross-sectional survey examined Karen villagers from a developed and a less-developed village on February 24 and March 26, 2003 to evaluate the prevalence and social correlates of methamphetamine use in northern Thailand. Data were collected in face-to-face interviews using a structured questionnaire.

Results: The response rate was 79.3% (n = 548). In all, 9.9% (males 17.6%, females 1.7%) of villagers reported methamphetamine use in the previous year. Methamphetamine was used mostly by males and was significantly related to primary or lower education; to ever having worked in town; to having used opium, marijuana, or heroin in the past year; and to ever having been diagnosed with a sexually transmitted infection (STI).

Conclusion: Since labor migration to towns is increasingly common among ethnic minorities, the prevention of methamphetamine use and of HIV/STI infection among methamphetamine users should be prioritized to prevent HIV in this minority population in Thailand.

Background

Historically, Thailand was once notorious for its opium production, which started in the late nineteenth century and continued until the mid twentieth century [1]. However, in modern Thailand methamphetamine is the most popular illicit drug. Of all new hospital admissions for

drug treatment in Thailand in 2006, 75.6% (n = 29,235) of patients were admitted for methamphetamine use. Furthermore, 75.2% (n = 51,457) of all drug-related arrests in 2006 were methamphetamine related [2]. A household survey conducted in 2003 suggested that 0.2% of the 45 million Thai people aged 12 to 65 years had used meth-

amphetamine during the previous year (2002), and 2.4% had used it in their lifetimes [3]. There is increasing concern that methamphetamine use is now prevalent among young people (aged 15–21 years) in Thailand. A urine test conducted among vocational school students in this age group (n = 1725) determined that 10.3% of this study group tested positive for current methamphetamine use. Additionally, 29.0% of the study group reported having ever used methamphetamine [4]. Moreover, methamphetamine use has been identified among highland ethnic minorities in areas of upper northern Thailand [5,6].

In Thailand, roughly 1 million people are members of ethnic minorities, constituting 1.6% of the entire Thai population. These minorities have distinct cultural backgrounds, practices and languages. Most (approximately 920,000) are members of nine ethnic minorities that reside in the highland areas at elevations from 500 to 2,500 meters. These highlanders are officially classified as "hill tribes," or highland ethnic minorities, among which the Karen account for the largest population (47.5%) [7,8]. Karen villagers originally resided in Myanmar for centuries but began to migrate into Thailand in the eighteenth century; today the vast majority of Karens, some 4 million, still remain in Myanmar [9]. While they face a struggle to attain their basic human rights, including democracy, and self-determination, the Karen in Thailand also face cultural and political discrimination. There is a stereotyped public view that highland ethnic minorities, including Karen residents, practice forest destruction by engaging in swidden cultivation, despite the fact that much of the deforestation has been caused by illegal logging [10]. Although the Karen have been mobile for many centuries, migration to lowland cities in search of labor or educational opportunities has increased in recent years. This was especially true in the 1980s for Karen youth. The increasing migration, together with improved infrastructure and media access in the remote villages, has resulted in a rise in material possessions that represent an elevation to prestigious cultural status as well as significant changes in lifestyle, sexual morality, and sexual behaviors [11].

Although opium is traditionally cultivated and used among some highland ethnic minorities, methamphetamine was first used in the highland communities in around 1996 [6]. Methamphetamine use was thought to be more common among Thais than among highland ethnic minorities, as reflected in the results of a recent survey of people attending a drug treatment center in northern Thailand [5]. Apart from its direct toxicity, methamphetamine represents a serious health concern in the context of the HIV epidemic. This is because methamphetamine use leads to engagement in other illicit drug use [12,13], sexual initiation or increase in sexual activity [14,15], multi-

ple steady male partners [15], and STIs [12], though the factors associated with methamphetamine use vary depending on the study population. However, little is known about recent methamphetamine use among ethnic minority villagers in the highlands, where a rapid cultural shift is leading to increased social and cultural mixing with lowland Thai societies, in which the prevalence of methamphetamine use and HIV are high.

In 2003, we conducted a cross-sectional survey in two Karen villages, located in a mountainous area and with differing levels of development, to study the prevalence and social correlates of sexual behaviors, including drug use [16]. In this article, we reanalyze the data, focusing on the demographic and behavioral characteristics of methamphetamine users and the correlates of methamphetamine use.

Methods

The method used in the study is described elsewhere [16]. Briefly, we conducted a survey in two Karen villages at different levels of infrastructural development in a mountainous region in northern Thailand. The two villages were selected from villages in Category 1, the most developed level, and Category 3, a less developed level, based on the government categorization; among five possible levels within that categorization, more than 90% of villages in the study districts are classified in categories 1 to 3 [7]. We recruited all 15- to 54-year-old residents for the study, assuming that the differences between villages might reflect changes in culture and consequently in the behavioral patterns of the villagers. In detail, village A had electricity and a paved road linking it to town, enabling convenient year-round access to information and town life, whereas village B had no such infrastructure, limiting the villagers' access to town, especially in the rainy season.

Data were collected on February 24 and March 26, 2003. Six Karen health workers, three for each village, conducted face-to-face interviews at the respondents' homes in each village using a structured questionnaire. The questionnaire was developed based on results of eight focus group interviews with male and female Karen villagers. The questionnaire, written in Thai, was translated into the local languages through discussions among interviewers. For sensitive questions, such as questions about drug-related and sexual attitudes or behaviors, a separate answer sheet was prepared, and illustrations were used for those who were illiterate. Prior to the data-collection phase, we pretested the questionnaire in other villages that were distant from the study villages, and then revised the questions iteratively as needed. Informed consent was obtained and no names or other identifiers were collected. After completing each interview, the consent form, ques-

tionnaire, and answer sheet were put in an envelope and sealed in front of the respondent.

For statistical analysis, the chi-square test and Fisher's exact test when necessary were used for bivariate analysis, and a multiple logistic regression analysis was used to identify variables independently associated with methamphetamine use by entering all of the variables simultaneously. $P < 0.05$ was used as the critical value to determine statistical significance. In both the bivariate and multivariable analyses, the data for males and females and the data for methamphetamine non-users (users of opium, marijuana, or heroin only) and drug non-users were combined due to the small number of females and methamphetamine non-users; this actually had a limited influence on the characteristics of the combined population. The variable "graduated from a school in town" was excluded from the multivariable analysis, since it was strongly ($r > 0.7$) correlated with another variable, education. Variables such as age, religion, education, and main occupation were transformed into dichotomous variables for the bivariate and multivariable analyses.

The study protocol was approved by the National Research Council of Thailand and by the Kyoto University Graduate School and Faculty of Medicine Ethics Committee.

Results

Out of the 691 15- to 54-year-old residents of both villages, those who were not seen for three home visits or

who were missing essential data on methamphetamine use, sex, age, or sexual behaviors were excluded from the analysis. This resulted in a total response rate of 79.3% ($n = 548$), 80.7% in village A and 76.8% in village B. None of residents visited by interviewers refused to answer the questionnaire.

Table 1 shows the situation of drug use among participants, of whom 9.9% (male 17.6%, female 1.7%) reported methamphetamine use in the past year and 13.3% (male 22.6%, female 3.5%) reported the use of at least one of four major drugs. In both villages, the drug users were predominantly male and methamphetamine was the most commonly used drug; only one participant reported injection drug use. Of the drug users, 61.0% and 36.4% of male users in Villages A and B, respectively, were multiple drug users, whereas all of the female users were single drug users.

Table 2 describes the characteristics of the villagers according to methamphetamine use in the past year. Demographic characteristics such as age, marital status, religion, education, and graduation from a school in town were similar in both the methamphetamine users and methamphetamine/drug non-users. Methamphetamine users were more likely to be daily wage laborers, to have ever worked in town, to have used other drugs in the past year, to have ever been diagnosed with STIs in their lifetimes compared to those who were methamphetamine/drug non-users.

Table 1: Drug use among Karen villagers in the past one year*

Drug use	Village A						Village B						Grand total (n = 548)	
	Male (n = 174)		Female (n = 182)		Total (n = 356)		Male (n = 100)		Female (n = 92)		Total (n = 192)			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Methamphetamine use ^c	34	19.5	5	2.7	39	11.0	15	15.0	0	0.0	15	7.8	54	9.9
Opium use ^c	16	9.2	2	1.1	18	5.1	11	11.0	3	3.3	14	7.3	32	5.8
Marijuana use ^c	18	10.3	0	0.0	18	5.1	3	3.0	0	0.0	3	1.6	21	3.8
Heroin use ^c	11	6.3	0	0.0	11	3.1	2	2.0	0	0.0	2	1.0	13	2.4
Any of 4 drugs ^b use	41	23.6	7	3.8	48	13.5	22	22.0	3	3.3	25	13.0	73	13.3
Methamphetamine non-used ^d	7	4.0	2	1.1	9	2.5	7	7.0	3	3.3	10	5.2	19	3.5
Non-drug use	130	74.7	174	95.6	304	85.4	74	74.0	88	95.7	162	84.4	466	85.0
Missing data	3	1.7	1	0.5	4	1.1	4	4.0	1	1.1	5	2.6	9	1.6
Drug injection	0	0.0	0	0.0	0	0.0	1	1.0	0	0.0	1	0.5	1	0.2

*Proportion of missing data varied from 0.5 to 6.7%

^bMethamphetamine, opium, marijuana, or heroin

^cIncluded multiple use

^dIncluded multiple use except for methamphetamine

Table 2: Characteristics of villagers by status of drug use in the past one year^a

Variables	Methamphetamine user						Methamphetamine/drug non-user ^b						
	Village A (n = 39)		Village B (n = 15)		Total (n = 54)		Village A (n = 317)		Village B (n = 177)		Total (n = 494)		
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	
Age group (years)	15 – 24	18	46.2	2	13.3	20	37.0	141	44.5	66	37.3	207	41.9
	25 – 34	11	28.2	3	20.0	14	25.9	85	26.8	58	32.8	143	28.9
	35 – 44	5	12.8	7	46.7	12	22.2	73	23.0	37	20.9	110	22.3
	45 – 54	5	12.8	3	20.0	8	14.8	18	5.7	16	9.0	34	6.9
Sex	Male	34	87.2	15	100.0	49	90.7	140	44.2	85	48.0	225	45.5
	Female	5	12.8	0	0.0	5	9.3	177	55.8	92	52.0	269	54.5
Marital status	Never married	17	43.6	1	6.7	18	33.3	107	33.8	57	32.2	164	33.2
Religion	Christianity	15	38.5	13	86.7	28	51.9	73	23.0	144	81.4	217	43.9
	Animism	3	7.7	2	13.3	5	9.3	22	6.9	9	5.1	31	6.3
	Buddhism	20	51.3	0	0.0	20	37.0	211	66.6	22	12.4	233	47.2
	Missing data	1	2.6	0	0.0	1	1.9	11	3.5	2	1.1	13	2.6
Education	Primary or lower	25	64.1	15	100.0	40	74.1	188	59.3	135	76.3	323	65.4
	Junior high school	7	17.9	0	0.0	7	13.0	73	23.0	21	11.9	94	19.0
	High school or higher	6	15.4	0	0.0	6	11.1	52	16.4	20	11.3	72	14.6
	Missing data	1	2.6	0	0.0	1	1.9	4	1.3	1	0.6	5	1.0
Main occupation	Farmer	20	51.3	15	100.0	35	64.8	215	67.8	145	81.9	360	72.9
	Daily wage laborer	14	35.9	0	0.0	14	25.9	26	8.2	10	5.6	36	7.3
	Student	0	0.0	0	0.0	0	0.0	41	12.9	20	11.3	61	12.3
	Other	4	10.3	0	0.0	4	7.4	28	8.8	1	0.6	29	5.9
	Missing data	1	2.6	0	0.0	1	1.9	7	2.2	1	0.6	8	1.6
Graduated from a school in town	Graduated	9	23.1	0	0.0	9	16.7	82	25.9	36	20.3	118	23.9
	Missing data	1	2.6	0	0.0	1	1.9	15	4.7	3	1.7	18	3.6
Ever worked in town	Ever worked	16	41.0	10	66.7	26	48.1	50	15.8	47	26.6	97	19.6
	Missing data	0	0.0	0	0.0	0	0.0	11	3.5	1	0.6	12	2.4
Opium use	Yes	11	28.2	6	40.0	17	31.5	7	2.2	8	4.5	15	3.0
	Missing data	0	0.0	0	0.0	0	0.0	1	0.3	1	0.6	2	0.4
Marijuana use	Yes	15	38.5	0	0.0	15	27.8	3	0.9	3	1.7	6	1.2
	Missing data	0	0.0	1	6.7	1	1.9	4	1.3	3	1.7	7	1.4
Heroin use	Yes	9	23.1	0	0.0	9	16.7	2	0.6	2	1.1	4	0.8
	Missing data	0	0.0	1	6.7	1	1.9	1	0.3	5	2.8	6	1.2
Opium, Marijuana, or Heroin use	Yes	23	59.0	6	40.0	29	53.7	9	2.8	10	5.6	19	3.8
	Missing data	0	0.0	0	0.0	0	0.0	4	1.3	5	2.8	9	1.8
Ever diagnosed with STIs	Yes	5	12.8	1	6.7	6	11.1	3	0.9	3	1.7	6	1.2
	No (Ever had sex)	21	53.8	12	80.0	33	61.1	210	66.2	114	64.4	324	65.6
	No (Never had sex)	13	33.3	1	6.7	14	25.9	103	32.5	54	30.5	157	31.8
	Missing data	0	0.0	1	6.7	1	1.9	1	0.3	6	3.4	7	1.4

^aN = 548, Those who missed the answer on methamphetamine use were excluded^bIncluding methamphetamine non-user and drug non-user

Among methamphetamine users, those from village A (developed) were more likely to be younger, to never have been married, to be daily wage laborers, to have graduated from a school in town, to have never worked in town, to have used marijuana and heroin in the past year, to have been diagnosed with an STI in their lifetimes, compared to those from Village B; no such differences were seen between villages within methamphetamine/drug non-users.

Table 3 shows the results of the bivariate and multivariable analyses of the Karen villagers. In the bivariate analysis, the respondents who were male; had never married; were not farmers; had worked in town; had used opium, marijuana, or heroin in the past year; and had been diag-

nosed with an STI were significantly more likely to be methamphetamine users. The multivariable analysis showed that respondents who were male; had primary or lower education; had worked in town; were opium, marijuana, or heroin users in the past year; and had ever been diagnosed with an STI were significantly more likely to be methamphetamine users.

Discussion

To our knowledge, this is the first study to describe the prevalence of methamphetamine use and its correlates among the Karen villagers in a mountainous area of northern Thailand. Specifically, our study revealed that in 2003 methamphetamine was readily available and was used by 9.9% of the residents of two separate Karen vil-

Table 3: Correlates of Methamphetamine use in the past one year among Karen villagers

Variables	N	MA ^a user		Bivariate analyses			Multivariable analyses			
		n	%	P-value	OR	95CI	P-value	AOR	95CI	
Village	A (developed)	356	39	11.0	0.239	1.45	(0.78 – 2.71)	0.109	2.20	(0.84 – 5.78)
	B (traditional)	192	15	7.8		1.00				
Age group (years)	15 – 34	384	34	8.9	0.229	0.70	(0.39 – 1.26)	0.440	1.46	(0.56 – 3.82)
	35 – 54	164	20	12.2		1.00				
Sex	Male	274	49	17.9	0.000	11.72	(4.59 – 29.91)	0.012	3.90	(1.35 – 11.28)
	Female	274	5	1.8		1.00				
Marital status	Never married	182	18	9.9	0.984	1.01	(0.55 – 1.83)	0.275	2.90	(0.43 – 19.68)
	Ever married	366	36	9.8		1.00				
Religion	Christian	245	28	11.4	0.285	1.36	(0.77 – 2.41)	0.893	1.06	(0.44 – 2.56)
	Buddhism or Animism	289	25	8.7		1.00				
Education	Primary or lower	363	40	11.0	0.166	1.58	(0.82 – 3.04)	0.038	3.10	(1.06 – 9.03)
	Junior high school or higher	179	13	7.3		1.00				
Main occupation	Other than Farmer ^c	144	18	12.5	0.209	1.47	(0.80 – 2.69)	0.400	1.52	(0.58 – 4.01)
	Farmer	395	35	8.9		1.00				
Graduated from a school in town	Not graduated	402	44	10.9	0.207	1.61	(0.76 – 3.40)		-	
	Graduated	127	9	7.1		1.00				
Ever worked in town	Ever worked	123	26	21.1	0.000	3.69	(2.07 – 6.57)	0.003	3.55	(1.53 – 8.28)
	Never worked	413	28	6.8		1.00				
Opium, Marijuana or Heroin use	Yes	48	29	60.4	0.000 ^b	28.45	(14.06 – 57.56)	0.000	19.63	(8.04 – 47.94)
	No	491	25	5.1		1.00				
Ever diagnosed with STIs	Yes	12	6	50.0	0.000	11.21	(3.19 – 39.41)	0.008	20.76	(2.18 – 197.43)
	No (Ever had sex)	357	33	9.2	0.690	1.14	(0.59 – 2.20)	0.238	2.95	(0.49 – 17.88)
	No (Never had sex)	171	14	8.2		1.00				

^aMethamphetamine

^bFisher's exact test

^cDaily wage worker (n = 50), student (n = 61), jobless (n = 26), housework (n = 6), other job (n = 1)

lages. This is a much higher rate than that reported for the general Thai population (2.4% in 2001, and 0.2% in 2003 [3]), contrary to what has been suggested in previous reports. The results presented herein strongly suggest that methamphetamine use may have spread within the Karen population since its introduction in the mid 1990s.

In contrast to our hypothesis that residential development would significantly affect the drug-use behavior patterns of the local villagers, the results of the multivariable analysis showed that experience of working in town (rather than the level of development of one's village) was the significant predictor of methamphetamine use. Contact with lowland Thai society through labor migration might have increased the use of methamphetamine because it enables laborers to work longer hours or to cope with work-related stress associated with different socio-cultural situations. It is also possible that once exposed to methamphetamine, Karen villagers might be less reluctant than Thais to use new narcotic drugs, including methamphetamine, owing to the Karen's cultural and traditional use of opium, dating from the late nineteenth century [17]. The fact that the use of opium, marijuana, or heroin was a very strong predictor of methamphetamine use supports this inference. Importantly, the multivariable analysis showed that a history of an STI was potentially associated with methamphetamine use, suggesting that methamphetamine users constitute an important subpopulation of Karen villagers that should be targeted by HIV-prevention programs.

There are some limitations to our study. There may have been interviewer or reporting bias despite the intensive training of the interviewers before data collection and the use of a separate answer sheet, with illustrations for those who were illiterate, for responding to sensitive questions. The small number of methamphetamine users ($n = 54$) may make the model unstable and reduce the statistical power. We may not be able to generalize the results to the entire Karen population, since the results were for only two villages. Furthermore, our results may have been influenced by the so-called "war on drugs" that the Thai government started to crack down on drug businesses in February, 2003, the month our study started; however, this influence may have been mixed, since one study identified a reduction in methamphetamine use among middle school students after the "war" began [18], while another study observed a shift to methamphetamine use from injected drugs among injection-drug users [19].

Conclusion

Despite these limitations, our study identified a high prevalence of methamphetamine use among highland Karen villagers and a strong association with experience of working in town. Since labor migration to town is increasingly

common among ethnic minorities in Thailand, with the hope of achieving better economic status, the prevention of methamphetamine use and of HIV/STI infection among methamphetamine users should be given priority among minority populations in Thailand.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

EK planned the study and its design, carried out the data collection, analysis, and interpretation, and drafted the manuscript. SV developed the study design, coordinated the study, participated in collection the data, and made comment to the manuscript. YM participated in data analysis, data interpretation, and manuscript writing. SW was involved in coordination of the study, collection and interpretation of the data. AK was involved in data collection and analysis, and made comment to the manuscript. MOK participated in development of the questionnaire, data interpretation, and made comment to the manuscript. YH participated in development of research conception, revision of the questionnaire, and interpretation of the data from anthropological perspectives on the Karen. MK participated in planning of the study design, data analysis and interpretation, made comment to the manuscript and gave final approval for the submission of the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We thank all the Karen respondents, interviewers, and staff at health centers of the Chiang Mai Provincial Health Office for their cooperation. This study was supported by a research grant from the Japanese Association for Sex Education.

References

1. Suwanwela C, Kanchanahuta S, Onthum Y: Hill tribe opium addicts: a retrospective study of 1,382 patients. *Bull Narc* 1979, **31**(1):23-40.
2. UNODC: Patterns and Trends of Amphetamine-Type Stimulants (ATS) and Other Drugs of Abuse in East Asia and the Pacific 2005. A Report from Project: AD/RAS/01/F97 Improving ATS Data and Information Systems. Bangkok: United Nations Office on Drugs and Crime Regional Centre for Asia and the Pacific; 2006.
3. Office of Narcotics Control Board MoJ: Status of substance use, National Household Survey 2003. Ministry of Justice, Thailand; 2004.
4. van Griensven F, Supawitkul S, Kilmarx PH, Limpakarnjanarat K, Young NL, Manopalboon C, Mock PA, Korattana S, Mastro TD: Rapid assessment of sexual behavior, drug use, human immunodeficiency virus, and sexually transmitted diseases in northern Thai youth using audio-computer-assisted self-interviewing and noninvasive specimen collection. *Pediatrics* 2001, **108**(1):E13.
5. Beyrer C, Razak MH, Jittiwutikarn J, Suriyanon V, Vongchak T, Srirak N, Kawichai S, Tovanabutra S, Rungruengthanakit K, Sawanpanyalert P, et al: Methamphetamine users in northern Thailand: changing demographics and risks for HIV and STD among treatment-seeking substance abusers. *Int J STD AIDS* 2004, **15**(10):697-704.

6. Vatahong C: **Drug problems among hill tribe Thais.** In *First National Academic Conference on Dependent Drug Bangkok: Drug Suppression Unit, Prime Minister's Office*; 2002:36-45.
7. Department of Public Welfare MoLaW: **Highland Community within 20 Provinces of Thailand, 2002.** Ministry of Labour and Welfare; 2002.
8. Schliesinger J: *Ethnic Groups of Thailand: Non-Tai-Speaking Peoples* Bangkok: White Lotus; 2000.
9. Lewis P, Lewis E: *Peoples of the Golden Triangle* London: Thames and Hudson; 1998.
10. Hayami Y, Darlington S: **The Karen of Burma and Thailand.** In *Endangered People of Southeast and East Asia: Struggles to Survive and Thrive* Edited by: Sponsel LE. Westport: Greenwood Press; 2000.
11. Hayami Y: **Morality, Sexuality and Mobility: Changing Moral Discourse and Self.** In *Living at the Edge of Thai Society: The Karen in the highlands of northern Thailand* Edited by: Delang CO. London: Routledge/Curzon; 2003:112-129.
12. Melbye K, Khamboonruang C, Kunawararak P, Celentano DD, Prapamontol T, Nelson KE, Natpratan C, Beyrer C: **Lifetime correlates associated with amphetamine use among northern Thai men attending STD and HIV anonymous test sites.** *Drug Alcohol Depend* 2002, **68(3)**:245-253.
13. Sattah MV, Supawitkul S, Dondero TJ, Kilmarx PH, Young NL, Mastro TD, Chalkummao S, Manopalboon C, Griensven F: **Prevalence of and risk factors for methamphetamine use in northern Thai youth: results of an audio-computer-assisted self-interviewing survey with urine testing.** *Addiction* 2002, **97(7)**:801-808.
14. Liu A, Kilmarx P, Jenkins RA, Manopalboon C, Mock PA, Jeeyapunt S, Uthairoravit W, van Griensven F: **Sexual initiation, substance use, and sexual behavior and knowledge among vocational students in northern Thailand.** *Int Fam Plan Perspect* 2006, **32(3)**:126-135.
15. Allen DR, Carey JW, Manopalboon C, Jenkins RA, Uthairoravit W, Kilmarx PH, van Griensven F: **Sexual health risks among young Thai women: implications for HIV/STD prevention and contraception.** *AIDS Behav* 2003, **7(1)**:9-21.
16. Kobori E, Visrutaratna S, Kada A, Wongchai S, Ono-Kihara M, Kihara M: **Prevalence and correlates of sexual behaviors among Karen villagers in northern Thailand.** *AIDS Behav* 2007, **11(4)**:611-618.
17. Renard RD: *Opium reduction in Thailand 1970-2000: A thirty-year journey* Chiang Mai: United Nations International Drug Control Program (UNDCP); 2001.
18. Daosodsai P, Bellis MA, Hughes K, Hughes S, Daosodsai S, Syed Q: **Thai War on Drugs: measuring changes in methamphetamine and other substance use by school students through matched cross sectional surveys.** *Addict Behav* 2007, **32(8)**:1733-1739.
19. Vongchak T, Kawichai S, Sherman S, Celentano D, Sirisanthana T, Latkin C, Wiboonnatakul K, Srirak N, Jitwiwitkarn J, Aramrattana A: **The influence of Thailand's 2003 'war on drugs' policy on self-reported drug use among injection drug users in Chiang Mai, Thailand.** *International Journal of Drug Policy* 2005, **16(2)**:115-121.

Pre-publication history

The pre-publication history for this paper can be accessed here:

<http://www.biomedcentral.com/1472-698X/9/11/prepub>

Publish with **BioMed Central** and every scientist can read your work free of charge

"BioMed Central will be the most significant development for disseminating the results of biomedical research in our lifetime."

Sir Paul Nurse, Cancer Research UK

Your research papers will be:

- available free of charge to the entire biomedical community
- peer reviewed and published immediately upon acceptance
- cited in PubMed and archived on PubMed Central
- yours — you keep the copyright

Submit your manuscript here:
http://www.biomedcentral.com/info/publishing_adv.asp



Research article

Open Access

Early initiation of sexual activity: a risk factor for sexually transmitted diseases, HIV infection, and unwanted pregnancy among university students in China

Qiaoqin Ma^{*1,2}, Masako Ono-Kihara², Liming Cong¹, Guozhang Xu³, Xiaohong Pan¹, Saman Zamani², Shahrzad Mortazavi Ravari², Dandan Zhang³, Takayuki Homma⁴ and Masahiro Kihara²

Address: ¹Center for Disease Control and Prevention of Zhejiang Province, Hangzhou, 310051, PR China, ²Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, 606-8501, Japan, ³Center for Disease Control and Prevention of Ningbo Municipality, Ningbo, 315010, PR China and ⁴Kanazawa University Graduate School of Natural Science & Technology, Kanazawa city, Ishikawa, 920-1192, Japan

Email: Qiaoqin Ma* - qiaoqinma@yahoo.com.cn; Masako Ono-Kihara - okmasako@pbh.med.kyoto-u.ac.jp; Liming Cong - conglm@hotmail.com; Guozhang Xu - xugzh@nbcdd.org.cn; Xiaohong Pan - xhpan310009@yahoo.com.cn; Saman Zamani - sam261@yahoo.com.jp; Shahrzad Mortazavi Ravari - sh_mortazavi@pbh.med.kyoto-u.ac.jp; Dandan Zhang - zhangdd@nbcdd.org.cn; Takayuki Homma - honma-kyt@umin.ac.jp; Masahiro Kihara - poghse@pbh.med.kyoto-u.ac.jp

* Corresponding author

Published: 22 April 2009

Received: 29 August 2008

BMC Public Health 2009, 9:111 doi:10.1186/1471-2458-9-111

Accepted: 22 April 2009

This article is available from: <http://www.biomedcentral.com/1471-2458/9/111>

© 2009 Ma et al; licensee BioMed Central Ltd.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract

Background: To explore any association between the timing of the initiation of sexual activity and sexual behaviors and risks among university students in China.

Methods: Data were derived from a cross-sectional study on sexual behavior among university students conducted in Ningbo municipality, China, at the end of 2003. Students completed a self-administered, structured questionnaire. Of 1981 sexually active male students, 1908 (96.3%) completed the item for timing of the initiation of sexual activity and were included in bivariate trend analyses and multiple logistic regression analyses to compare the association between this timing and sexual behavior and risks.

Results: Male early sexual initiators had a significantly higher risk profile, including a significantly higher proportion reporting non-regular partners (i.e., casual or commercial partners), multiple partners, diagnosis with a sexually transmitted disease (STD), partner history of pregnancy, partner history of induced abortion, and less condom and oral contraceptive use, compared with late initiators. Multivariate analyses confirmed the increased likelihood of these risks in early initiators versus late initiators, other than partner type during the last year.

Conclusion: Our results showed that, compared to late initiators, people who initiated sexual activity early engaged in more risky behaviors that could lead to elevated risks of unwanted pregnancies and STDs or human immunodeficiency virus infection. Sex-education strategies should be focused on an earlier age, should include advice on delaying the age of first sexual activity, and should target young people who continue to take sexual risks.

Background

Sexual activity rates in Chinese university students are still low; studies in different regions have shown that the range of those engaging in sexual activity is between 5 and 20% [1-5]. However, with the great changes in the economy and culture in China since the start of its open-door policies in the 1970s and the economic reforms of the 1980s, the sexual behaviors and attitudes of Chinese people are changing rapidly, becoming more active and liberal [6-8]. More and more young people are having sex at an earlier age, and they generally do not protect themselves [9,10]; indeed, the age of sexual activity onset in university students has decreased [4]. At the same time, sexually transmitted diseases (STDs) and a human immunodeficiency virus (HIV) epidemic have spread rapidly in China in recent years [11]. National reports in 2005 and 2007 indicated that HIV/acquired immunodeficiency syndrome (AIDS) is still on the rise, spreading from high-risk groups to the general population, and the proportion of sexual transmission among HIV-infected persons is increasing each year [12,13]. STD incidence is one of the highest among all notifiable infectious diseases [14]. From 1987 to 2006, the reported incidence of syphilis increased from .08 to 13.35 per 100,000 people [13]. Previous reports have indicated that, although the rate of sexual activity in Chinese university students is generally low, some sexually active students engage in much risky behaviors, including very low condom use, very low contraceptive use generally, and sex with multiple and commercial partners [2-5]. Such behaviors make them vulnerable to STD/HIV infection and pregnancy. With more people being likely to initiate sexual activity earlier than ever before, often becoming sexually active in the adolescent period, there is serious concern regarding the health consequences of such early sexual initiation. However, information about the behavioral characteristics of those who initiate sexual activity early and the risks among young Chinese people, including university/college students, is very limited. If safe-sex education programs are to be successful in the future for Chinese students, a better understanding of early onset sexual activity and subsequent sex-related risks and behaviors among young people is necessary.

The purpose of this study was to explore the relationship between early initiation of sexual activity and risks to sexual and reproductive health among a group of sexually active male university students in an eastern Chinese city, and to understand how best to tailor effective sex education for this sort of population.

Methods

Setting and Procedures

This research was conducted in Ningbo municipality, a large coastal city in Zhejiang Province in eastern China

that is home to two universities, both of which participated in the study. The research methods have been introduced elsewhere [8]. Briefly, an instrument was developed based on a review of domestic and international literature, modified by qualitative studies that included 11 in-depth interviews and four focus groups among students from the two universities. The revised instrument was pilot tested in a group of 50 students at one of the universities. Then, the instrument's reliability was evaluated in 89 of 160 college students recruited from another city, who could be matched between the two tests with a one-week interval. The survey was conducted in November and December, 2003. All grade I-IV students at the two universities were requested by university staff and student leaders to come to classrooms at specified times outside normal lecture hours to fill out a self-administered and anonymous questionnaire. The trained staff of the local Centers for Disease Control (CDC) and the two universities collected data in the field.

Participants

Of the total of 29,409 eligible participants at the two universities, 22,940 (78.0%) actually responded; 447 were eliminated from the analysis due to evident invalid responses. Thus, 22,493 students responded validly (valid response rate of 76.5%). Of the 22,493 respondents, 1981 (17.6%) men and 963 (8.6%) women reported being sexually active. In this paper, sexually active male students who responded to the question, "in which school period did you initiate sexual activity," were included in the analysis, resulting in a final sample size of 1908 men, 96.3% of all sexually active male students. Female students were excluded because only a small number of them were sexually active before high school (i.e., in primary school or junior high school). We categorized sexually active male students into three groups according to the timing of their reported sexual initiation: those who initiated sex before high school (BHS initiator), those who initiated sex in high school (HS initiator), and those who reported initiating sex at university (Univ initiator).

Ethical assessment

The research protocol, including the questionnaire, was ratified by the institutional review processes of the local education board, the two universities involved, and Zhejiang Provincial Center for Disease Prevention and Control. Participants were informed of the purpose and the methods of the study. All were welcome to participate, with no advantage or disadvantage for participation or non-participation. These policies were also printed on the front page of the questionnaire.

Statistical analyses

Epi-Info (Version 6.0, CDC, Atlanta, GA) and SPSS for Windows (Version 12.01; SPSS Inc., Chicago, IL) were

employed for the analyses. Differences in the prevalence of sexual behaviors and their consequences and their relationship to the timing of sexual activity onset were assessed using a chi-square test for linear trends in proportion. Those variables exhibiting a significant linear trend, where greater risk was associated with the timing of sexual activity onset, were further assessed using multiple logistic regression analysis, adjusted for possible confounding by university, grade, faculty, hometown area, and reported family economic status, with sexual activity initiation in university as a reference. Lifetime sexual behavior and that during the most recent year were further adjusted for the duration of sexually active life, calculated by subtracting the age of first sexual activity from the current age, to adjust for confounding by different lengths of sexually active life versus the timing of sexual initiation. Adjusted odds ratios and 95% confidence intervals summarizing any association between the selected variables and the timing of sexual initiation were calculated for each category. A *P* value of less than 0.05 was deemed to indicate statistical significance.

Results

Socio-demographics

The percentages of the 1908 sexually active male students designated as BHS, HS, and Univ initiators were 6.0% (115), 36.9% (705), and 57.0% (1088), respectively (Table 1). The age range of all participants was 17–25 (median, 21). About three-quarters of the sexually active males among the BHS and HS initiators were aged over 19 years old; this age group made up 93.3% of Univ initia-

tors. Of the students, 94.8% of BHS and 95.7% of HS initiators were in Grades I–III, whereas 91.5% of Univ initiators were in Grades II–IV (Table 1). For all timings of sexual initiation, the majority of sexually active males perceived their family economic status to be mid-level, and the majority came from a town or city. The age range for initiating sexual activity in all participants was 10–24 (median, 20). The mean ages at first sexual activity for BHS, HS, and Univ initiators were 15.53 (SD, 1.94), 18.38 (SD, 1.25), and 20.44 (SD, 1.16), respectively.

Sexual behaviors and risks

At the first experience of intercourse, the proportion of sexually active male students who had sex with a non-regular partner (a casual or a commercial partner), was significantly greater in early than in late sexual initiators. The proportion of non-regular partners in BHS initiators was 35.7%, but it was only 10.2% in Univ initiators. An opposite trend was detected in condom use at first sex: 15.7% of BHS initiators and 32.9% of Univ initiators used condoms (Table 2).

In their most recent sexual experience, the proportion having sex with a non-regular partner was 26.1% in BHS initiators and 8.4% in Univ initiators, whereas the proportion of condom use in their most recent sexual activity was 32.2% in BHS initiators and 46.7% in Univ initiators. Oral contraceptive (OC) use by female partners was slightly higher in BHS initiators than in Univ initiators, although no significant difference was detected between them.

Table 1: Socio-demographic characteristics of sexually active males by timing of sex initiation.

Variables	Timing of sex initiation		
	BHS (n = 115) ^a	HS (n = 705) ^a	Univ (n = 1088) ^a
Current age			
≤ 19	21.4	24.3	6.7
> 19	78.6	75.7	93.3
Grade			
I	40.9	40.4	8.5
II	30.4	28.9	26.9
III	23.5	26.4	42.4
IV	5.2	4.3	22.2
Familys' economic status			
Rich	14.9	14.5	10.8
Between	73.7	79.1	82.2
Poor	11.4	6.4	7.0
Hometown area			
Countryside	24.6	19.1	27.3
Town/city	75.4	80.9	72.7
Mean age of first sex ± SD ^b	15.53 ± 1.94	18.38 ± 1.25	20.44 ± 1.16

^a Data were shown in percentages, and the percentages of some items may not add up to 100 due to missing data.

^b SD, standard deviation.

Table 2: Timing of sex initiation and its association with subsequent sexual behaviors and risks.

Variables	Total (n = 1908) ^a	BHS (n = 115) ^a	HS (n = 705) ^a	Univ (n = 1088) ^a	P value ^b
First sex					
Partner type					
Regular	85.4	60.9	83.4	89.2	
Non-regular	13.9	35.7	16.2	10.2	< 0.001
Condom use					
Used	29.8	15.7	27.2	32.9	< 0.001
Not used/unsure	69.8	84.3	72.2	66.6	
Most recent sex					
Partner type					
Regular	78.6	62.6	78.0	80.7	
Non-regular	10.5	26.1	11.2	8.4	< 0.001
Condom use					
Used	44.2	32.2	42.3	46.7	0.002
Not use	46.9	59.1	48.9	44.3	
OC use by partner					
Used	23.8	21.7	23.3	24.4	0.429
Not use	66.1	70.4	66.4	65.4	
Sex during last year^c					
Partner type					
Only regular	83.0	55.0	81.8	86.5	
Ever non-regular	14.7	40.0	17.4	10.6	< 0.001
Condom use					
Always/often	40.3	18.8	35.6	45.2	< 0.001
Never/rarely/sometime	55.1	76.3	60.4	49.9	
OC use by partner					
Always/often	22.3	13.8	20.2	24.4	0.003
Never/rarely/sometime	74.8	83.8	77.8	72.1	
Partner number					
1	74.1	33.8	66.0	82.9	
≥ 2	17.6	40.0	25.6	10.6	< 0.001
Sex over lifetime					
Condom use					
Always/often	41.7	20.9	38.3	46.1	< 0.001
Never/rarely/sometime	52.8	74.8	55.9	48.4	
Partner number					
1	56.9	15.7	40.7	71.8	
≥ 2	32.1	67.0	47.9	18.1	< 0.001
Anal sex					
Yes	3.9	12.2	4.3	2.8	< 0.001
No	90.7	83.5	90.1	91.8	
Partner's pregnancy					
Yes	10.2	24.3	10.2	8.6	< 0.001
No/unsure	85.3	70.4	84.8	87.2	
Partner's Induced abortion					
Yes	9.6	23.5	9.8	8.0	< 0.001
No/unsure	85.6	70.4	84.7	87.8	
Diagnosed with an STD					
Yes	1.3	7.0	1.6	0.6	< 0.001
No	89.3	86.1	87.8	90.5	

^a Data were shown in percentages, and the percentages of some items may not add up to 100 due to missing data.

^b Chi square test for linear trend in proportion.

^c n = 1409, 80, 500, 829, for Total, BHS, HS, Univ initiator, respectively.

Among sexually active males, 80 of BHS, 500 of HS, and 829 of Univ initiators were sexually active in the last year (69.6%, 70.9%, and 76.1%, respectively). In the last year, early initiators were significantly more likely to have ever had non-regular partners than late initiators; the propor-

tion ever having had a non-regular partner for BHS initiators was nearly four times that of Univ initiators (40.0% vs. 10.6%). Multiple partners were more prevalent among early than late initiators; the proportion was 40.0% in BHS initiators and 10.6% in Univ initiators. Early initia-

tors also reported being less likely to have often/always used condoms in the last year; the proportion was 18.8% in BHS initiators and 45.2% in Univ initiators. Early initiators also reported a lower likelihood that their female partner used OCs than did late initiators; the proportion of a partner's always/often using OC in BHS initiators was 13.8%, whereas it was 24.4% in Univ initiators.

With regard to sex during their lifetime, similar to sexual behaviors in the last year, early initiators were significantly more likely to have had multiple partners over their lifetimes and to have used condoms less frequently than late initiators. Anal sex was much more commonly conducted by early than late initiators; the rate was 12.2% for BHS initiators, and 2.8% for Univ initiators. Of the participants, 10.2% reported that they had impregnated a female partner. The prevalence was 24.3% for BHS initiators and 8.6% for Univ initiators; this trend and proportion were similar to female partners' reports of induced abortion. Although the reported diagnosed STD prevalence was generally low, BHS initiators were over ten

times more likely than Univ initiators to report having been diagnosed with an STD (7.0% vs. 0.6%).

A multivariate logistic regression model examining the relationship between early sexual initiation and sexual risk and controlling for possible confounding by university, grade, faculty, hometown area, and perceived family economic status, confirmed all trends from the bivariate analyses, showing that early sexual initiation was more likely to be associated with risky sexual behaviors and subsequent consequences. With regard to lifetime sexual behavior and that during the last year, after further adjusting for duration of sexual experience, all the trends showing an increased risk for early sexual initiation compared to late initiation remained, with the majority having an odds ratio > 2, except condom use during the most recent sex activity and number of partners in the last year (an odds ratio of around 1.5); with respect to partner type during the last year, introduction of this adjustment resulted in no such trend (Table 3).

Table 3: Multivariate analyses assessing the effects of timing of sexual initiation on subsequent sexual behavior and risks.

Variables	BHS	HS	Univ
	Adjusted Odds Ratio (95% Confidence Interval)		
Partner type first sex ^a			
Non-regular vs. regular	5.24 (3.28–8.36)	1.90 (1.40–2.59)	1.00
Condom use first sex ^a			
Not used/unsure vs. used	2.55 (1.50–4.33)	1.30 (1.03–1.64)	1.00
Partner type recent sex ^a			
Non-regular vs. regular	3.70(2.22–6.15)	1.36 (0.96–1.95)	1.00
Condom use recent sex ^a			
Not used vs. used	1.62 (1.05–2.52)	1.06 (0.85–1.33)	1.00
Partner type last year ^b			
Non-regular vs. regular	1.01 (0.40–2.54)	0.96 (0.61–1.53)	1.00
Condom use last year ^b			
Never/rarely/sometime vs. always/often	3.28 (1.36–7.89)	1.24 (0.88–1.73)	1.00
OC use by partner last year ^b			
Never/rarely/sometime vs. always/often	2.68 (1.03–6.98)	1.40 (0.96–2.06)	1.00
Partner number last year ^b			
≥ 2 vs. 1	1.44 (0.58–3.62)	1.43 (0.93–2.21)	1.00
Condom use lifetime ^b			
Never/rarely/sometimes vs. always/often	3.55 (1.74–7.26)	1.17 (0.88–1.56)	1.00
Partner number lifetime ^b			
≥ 2 vs. 1	4.19 (1.84–9.54)	2.81 (2.02–3.89)	1.00
Anal sex lifetime ^b			
Yes vs. no	2.28 (0.63–8.23)	1.15 (0.55–2.42)	1.00
Partner's pregnancy lifetime ^b			
Yes vs. no/unsure	2.89 (1.21–6.94)	1.42 (0.91–2.22)	1.00
Partner's Induced abortion lifetime ^b			
Yes vs. no/unsure	2.95 (1.20–7.26)	1.48 (0.93–2.36)	1.00
Diagnosed with an STD lifetime ^b			
Yes vs. no	26.13 (2.94–232.09)	5.11 (1.20–2.76)	1.00

^a Odds ratio with 95% confidence interval in parentheses is adjusted for university, grade, faculty, hometown area, and family economic status.

^b Odds ratio with 95% confidence interval in parentheses is further adjusted for the duration of sexual experience.

Discussion

The results of this study show that young people who initiated sexual activity early were at greater risk for a wide range of sexual and reproductive health problems. Our data showed a clear trend indicating that early onset of sexual activity was associated with increased STD infection, pregnancy, induced abortion, multiplicity of partners, and reduced condom and OC use. The higher incidence of risky behaviors and reproductive health problems attributable to early sexual initiation over a lifetime and sexual behavior in the most recent year may also be explainable by other factors, such as the length of sexual activity. However, the results of our multivariate analyses and indices of recent sexual behavior establish that this is not the whole picture.

In the study sample, the mean age of first sexual intercourse for BHS and HS initiators was 15.5 and 18.4 years, respectively, indicating that most BHS and HS initiators initiated sexual activity during adolescence; 6% of sexually active students initiated sexual activity before high school, and 37% did so in high school. These data show that it is important to conduct effective safe sex education for Chinese students at an early age. Thus, current condom education in China, typically conducted at universities [15], may simply be too late.

We also found that the prevalence of non-regular sex (i.e., sex with casual or commercial partners) at the time of the first experience of intercourse increased dramatically from late to early initiators; this trend was also consistent in the most recent year's behavior and the most recent sexual activity. We found that males whose first sexual experience was non-regular were then more likely to engage in non-regular sex and more likely to have multiple sexual partners during later sexual activity (data not shown). This may indicate that early initiators continued with their partner patterns after their first sexual experience. We also found that young people who began sexual activity in an early school period had an increased likelihood of having multiple partners during the past year and over their lifetime, relative to late initiators, which is consistent with results in other countries [16-20]. This effect persisted even after adjustment for the duration of sexual experience, suggesting that the multiple partnerships of early initiators were not due solely to the longer duration of their sexual experience. Indeed, these early sexual initiators may be more inclined to have multiple partners in their later sexual life than are late initiators. The data highlight that delay in the age of first sexual activity is an important element in reducing non-regular sex and the number of sexual partners; this is important because, among the early initiators, few precautions were taken despite risky sexual behaviors. Our data suggest that early initiators are less likely to adopt responsible behaviors

than late initiators, similar to findings in other countries [16,21,22]. The trend for early initiators to use condoms less in sexual activity was seen regardless of time period; these participants seemed not to be worried about STDs/HIV infection in themselves or their partners, or about pregnancy. The quite low rate of condom use in this group increased their risk of acquiring STDs and HIV. Condoms are widely available and affordable in China due to national family planning programs. Why these young initiators had such low condom use is unclear. It may be that early initiators, because of their youth, are less aware of the risks, embarrassed to obtain condoms, or lack the confidence or skill to negotiate condom use with their partners. Furthermore, they may not be prepared when they first engage in sexual activity; thus they do not use condoms then, and once non-protection is established, they continue in this manner, as has been reported in other countries [23,24].

Our results reveal that the earlier male students had initiated sexual activity, the more likely it was that their female partner had experienced pregnancy and induced abortion; similar findings have been reported in other countries, namely that early initiation of sexual activity was associated with pregnancy [16,20,25]. Because this trend remained even after controlling for the length of sexual activity, and because it was also consistent with the lower use of condoms and OC among early initiators compared with late initiators, the higher rates of pregnancy and induced abortions are not explained simply by longer exposure to sexual activity among the early initiators; indeed, the reduced use of oral contraceptives and condoms appears to be the key reason.

Although the reported diagnosed STD rate was low, early sexual activity was associated with increased prevalence of STDs, compared with late initiators. This higher rate of STDs is consistent with lower condom use among early initiators, suggesting that age at first intercourse is a marker for a history of STDs, as has been reported in research in other countries [26,27]. STDs can enhance the transmission of HIV; the early initiators who contracted STDs in this study were particularly vulnerable to HIV infection due to their own risky behaviors and their STD status.

We found a complex risky sexual profile that increased the risks of STDs/HIV infection in early initiators once they started sexual activity. Given the continuing expansion of the HIV/STD epidemic and the rapid social and economic changes in China, if more people initiate sexual activity at an earlier age, the spread of HIV and STDs can be expected to accelerate. Additionally, these male early initiators put both their female partners and themselves at greater risk of HIV/STD infection. Evidence from other countries has

shown that HIV transmission from males to females is two to three times more common than from females to males [28-31].

This study has several limitations. Our sample was from a cross-sectional study; whether early sexual initiation is a cause of a male's future risk or whether early sexual initiation increases the prevalence of other identified risky behaviors and reproductive health problems could not be determined from this study. Prospective studies are needed to address this question. Measurements of sexual activity in this study were based on self-reports; participant sensitivity regarding sexual behavior may have led to reporting bias. Additionally, misreporting of sexual behaviors is a recognized problem in sexual-behavior surveys [32]. Indeed, this was evident for some items in this study, with missing data being as high as 11%, which may have affected the power of testing and biased our results; however, we do not believe this lessens the validity of the overall conclusions of the study. Finally, the length of sexual experience was calculated by subtracting the age at first sexual activity from the current age. Because our sample consisted entirely of young people within a narrow age range, the value of using this adjustment may be limited. Additionally, any students who reported their current age and age of first sexual activity as being in the same year would have had a sexual lifetime of zero, which was clearly not the case; this applied to 26.6% of the 1908 sexually active students, which may have led to some bias in the results of the multivariate analysis.

Conclusion

Our results show that early sexual initiation was a significant predictor of unwanted pregnancy, induced abortion, and STD/HIV infection, emphasizing that controlling the age of first sex is important to reduce these risks. Since education is compulsory until high school in China, to ensure that sex-education programs reach all adolescents in time to encourage delaying sexual activity, junior high school-based programs may be an effective avenue for reaching this target group before they start engaging in sexual activity. Given the rapid change in sexual attitudes and behavior that is occurring among Chinese youth, it should be kept in mind that sex education at different stages of schooling is important in interrupting the transmission of STD/HIV and reducing unwanted pregnancy in this population. Furthermore, such education should address not only delaying first sexual activity but also other issues such as promoting the use of condoms, reducing the number of sexual partners, and addressing other factors that predispose young people to engage in risky sexual behaviors.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

QM performed the statistical analysis and drafted the manuscript; LC and GX coordinated the study in field; QM, PX, and DZ played a major role in the field survey; SZ, SMR and TH helped analyze the data; MOK and MK supervised the research, statistical analysis and revised the manuscript. All the authors read and approved the contents of the manuscript.

Acknowledgements

This study was funded by a grant from Japanese foundation for AIDS Prevention. The authors are grateful to the Ningbo Municipal Education Board, the 2 universities involved, as well as the participants and research team members from the Zhejiang Provincial and Ningbo Municipal Centers for Disease Control and prevention.

References

1. Li H, Zhang KL: **The progress of social behavior science related to HIV/AIDS.** *Chin J Prev Med* 1998, **32**(2):120-4.
2. Jiang JP, Huang J, Huang H, Ling W: **Survey of premarital sexual behavior survey and attitudes among university students.** *Chin sexology* 2000, **9**(2):26-8.
3. Li AL, Li LM, Zhang YC, Wang AZ: **A survey on STDs/AIDS knowledge, perception and sexual behavior among university students in Beijing.** *Chin Public Health* 1999, **13**(6):545-6.
4. Research Group on Sex Education among University Students: **Report on sexual behavior survey among Chinese university students in 2000.** *Youth Study (in Chinese)* 2001, **21**(12):31-9.
5. Liu L, Du YM: **Survey on HIV prevention knowledge and sexual behavior of university students.** *Disease surveillance (in Chinese)* 2004, **19**(10):385-386.
6. Hoy C: **Adolescents in China.** *Health Place* 2001, **7**(4):261-71.
7. Zhang K, Li D, Li H, Beck EJ: **Changing sexual attitudes and behaviour in China: implications for the spread of HIV and other sexually transmitted diseases.** *AIDS Care* 1999, **11**(5):581-9.
8. Ma Q, Ono-Kihara M, Cong L, Xu G, Zamani S, Ravari SM, Kihara M: **Sexual behavior and awareness of Chinese university students in transition with implied risk of sexually transmitted diseases and HIV infection: A cross-sectional study.** *BMC Public Health* 2006, **6**:232.
9. Gao ES, Tu XV, Yuan W: **Contraceptive use among unmarried female youth in Shanghai.** *Chin Pop Sci* 1997, **61**(4):57-64.
10. Cui N, Li MX, Wu SZ: **Study of unmarried people's reproductive health in Sichuan.** *Chin J Fam Plann* 2000, **8**(5):208-12.
11. Zhang KL, Ma SJ, Xia DY: **Epidemiology of HIV and sexually transmitted infections in China.** *Sex Health* 2004, **1**(1):39-46.
12. China Ministry of Health, Joint United Nations Programme on HIV/AIDS, World Health Organization: **2005 Update on the HIV/AIDS Epidemic and Response in China.** Beijing 2006.
13. State Council AIDS Working Committee Office, United Nations Theme Group on AIDS: **A joint assessment of HIV/AIDS prevention, treatment and care in China (2007).** Beijing 2007.
14. China Ministry of Health: **China statistical summary for health 2004, 2005, 2006.** Beijing: 2004, 2005, 2006, respectively.
15. China Ministry of Education: **Principal requirement for HIV/AIDS prevention in schools.** Beijing 2002.
16. Coker AL, Richter DL, Valols RF, McKeown RE, Garrison CZ, Vincent ML: **Correlates and consequences of early initiation of sexual intercourse.** *J Sch Health* 1994, **64**(9):372-7.
17. Sandfort TG, Orr M, Hirsch JS, Santelli J: **Long-term health correlates of timing of sexual debut: results from a national US study.** *Am J Public Health* 2008, **98**(1):155-61.
18. Santelli JS, Brener ND, Lowry R, Bhatt A, Zabin LS: **Multiple sexual partners among U.S. adolescents and young adults.** *Fam Plann Perspect* 1998, **30**(6):271-5.
19. Dolcini MM, Catania JA, Coates TJ, Stall R, Hudes ES, Gagnon JH, Pollock LM: **Demographic characteristics of heterosexuals with multiple partners: the National AIDS Behavioral Surveys.** *Fam Plann Perspect* 1993, **25**(5):208-14.