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CLINICAL ARTICLE

HIV, other sexually transmitted infections, and risk behaviors among female sex workers in Liuzhou, China

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ABSTRACT

Objective: To determine the prevalence of infections with HIV and hepatitis C virus (HCV), and of syphilis among female sex workers (FSWs) in Liuzhou, China, along with levels of HIV-related knowledge and frequencies of risk behaviors. *Methods:* A cross-sectional survey was conducted between July 2012 and January 2013. FSWs (aged ≥16 years; reported receiving payment for sex in previous 6 months) working at 58 selected commercial sex establishments (level 1 [>¥300 per transaction], level 2 [¥100–300], or level 3 [<¥100]) completed a questionnaire and provided blood samples for testing. *Results:* Of 622 participating FSWs, 7 (1.1%) had HIV infection, 67 (10.8%) syphilis, and 44 (7.1%) HCV infection. Consistent condom use during commercial sex encounters in the past month was reported by 412 (66.2%) FSWs. Inconsistent condom use was most likely in FSWs working in level 3 establishments (odds ratio [OR] 1.85; 95% CI 1.02–3.39), with a regular partner (OR 1.65; 95% CI 1.12–2.45), and who used illicit drugs (OR 2.10; 95% CI 1.24–3.54). Inconsistent condom use was least likely in FSWs with high HIV awareness (OR 0.29; 95% CI 0.18–0.48) and who had had a previous HIV test (OR 0.51; 95% CI 0.34–0.76). *Conclusion:* Further prioritized and combined programs aimed at FSWs are needed to prevent HIV transmission in China.

1. Introduction

In China, the annual reported number of individuals living with HIV/AIDS has been increasing, reaching 780 000 in 2011 [1]. Injecting drug use was the most common mode of infection until 2007, when heterosexual contact became the main transmission mode [1,2], the proportion of cases resulting from heterosexual transmission increased from 11.3% in 2005 to 38.9% in 2007 and 76.3% in 2011 [3]. How to prevent further sexual transmission is the great challenge in the control of the HIV epidemic in China.

Since the Chinese economic reform began in the 1980s, sexually transmitted infections (STIs) have re-emerged [4]. In the same period, the number of female sex workers (FSWs) has grown, with the figure reaching 4–10 million by 2004 [4,5]. FSWs are vulnerable to HIV and STIs, their rates of infection are higher than are those of the general population [6]. In 2009, government estimates suggested that 0.33%–0.94% of FSWs were living with HIV [7], but the prevalence has been as high as 8.3%–10.3% [8,9]. In one study in Yunnan [9], 4.8%–53.2% of FSWs reported having had STIs in the past, and 13.0%–90.6% tested positive for at least one STI.

Guangxi Zhuang Autonomous Region is located in South Central China. The HIV prevalence in this region is the second highest among the 31 provinces of mainland China [10]. Liuzhou is a city in the north of Guangxi, with a population of 3.7 million. Commercial sex trade flourishes in the city because the economy has been growing in recent years. By the end of 2010, 9982 people in Liuzhou were living with HIV/AIDS [11]. According to a report from the Chinese Ministry of Health [1], Guangxi Zhuang Autonomous Region is one of five provinces where more than 1% of FSWs are living with HIV. However, no FSWs tested in one study in Liuzhou [12] were HIV positive, and the prevalence was 0.5% in another investigation [13]. The aim of the present study was to determine the prevalence of infections with HIV and hepatitis C virus (HCV), and syphilis among FSWs in Liuzhou. A secondary aim was to identify the risk factors associated with inconsistent use of condoms.

2. Materials and methods

A cross-sectional study was conducted between July 1, 2012, and January 4, 2013. FSWs aged at least 16 years who reported receiving payment for sex in the previous 6 months were eligible for inclusion. Participants had to be willing to undergo testing and HIV/STI counseling.

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The study protocol was approved by the ethics committee of Anhui Medical University. All participants provided informed consent.

Participants were recruited using multistage sampling methods. Liuzhou has one urban district and five counties. To enable an assessment of STIs in both urban and rural areas, the urban district and one county were selected for inclusion. Liujiang County was randomly selected using a simple random sampling method. The sampling scheme was based on the map of commercial sex establishments maintained by the Liuzhou Center for Disease Control and Prevention (CDC) and Liujiang CDC, and all the sexual establishments in the map were identified by a pilot study. The identified sex establishments in the two areas were categorized into three levels according to the mean income of FSWs per transaction: at level 1 establishments, more than 300 Yuan were earned per transaction (e.g. bars, saunas, nightclubs, and karaoke bars); at level 2 establishments, 100–300 Yuan were earned per transaction (e.g. massage parlors and hair salons); and at level 3 establishments, less than 100 Yuan were earned per transaction (e.g. restaurants and inns). A sample of 10% of the establishments in each level was used: three level 1, 11 level 2, and 44 level 3 establishments were selected by local outreach workers by convenience sampling.

An anonymous questionnaire was developed and validated in a pilot study of 15 FSWs. The questionnaire consisted of three parts: demographic information, HIV-related knowledge, and sexual and HIV risk behaviors. HIV-related knowledge was evaluated by eight questions, to which participants needed to answer yes or no. Participants who gave at least six correct answers were deemed to have high awareness. They were also asked to rate their HIV-related knowledge (none, little, some, and a lot) and their risk of HIV infection (very likely, likely, unlikely and very unlikely). A regular sexual partner was defined as a man who was not a client and with whom the FSW had sexual contact, such as a boyfriend or husband. The survey was conducted face-to-face by an interviewer in a private room. Approximately 10–15 minutes were needed to complete each questionnaire.

Blood samples (3 mL from the median cubital vein) were obtained from FSWs by qualified doctors after the questionnaire was completed. The samples were tested in the Laboratory Department of Liuzhou CDC. They were screened for HIV antibodies by enzyme-linked immunosorbent assay (ELISA; Beijing Modern Gaoda Biotechnology Co, Beijing, China) and positive tests were confirmed by a HIV-1 western blot (Diagnostics HIV Blot 2.2, Genelabs, Singapore). Participants who had HIV infection were referred to their local CDC.

Syphilis was detected by a rapid plasma reagin test (Xindi Biological Pharmaceutical Engineering Co., Nanjing, China) and positive tests were confirmed by *Treponema pallidum* particle agglutination assay (Beijing Modern Gaoda Biotechnology Co, Beijing, China). The presence of anti-HCV antibody was detected by ELISA. FSWs who had syphilis or HCV infection were referred to the infectious diseases outpatient clinics of local hospitals.

Data were entered into a database twice and matched using EpiData 3.1 (The EpiData Association, Odense, Denmark). Analysis was done using SPSS 10.01 (SPSS Inc, Chicago, IL, USA). Differences between FSWs at the three levels were assessed by univariate analysis. The χ^2 test and linear-by-linear association test (trend tests) were used for proportional variables, and Fisher exact tests were used for contingency tables when more than 20% of the cells had expected counts less than five or one cell had an expected count of less than one. The one-way analysis of variance test was used for continuous variables.

Independent risk factors of inconsistent condom use were assessed using logistic regression analysis. Variables significant in the univariate analysis were included in a multivariate model. All testing was two-sided, and $P \leq 0.05$ was considered statistically significant.

3. Results

All 622 FSWs who worked in the 58 commercial sex establishments selected agreed to participate. Among the FSWs, 100 (16.1%) worked at level 1 establishments, 210 (33.8%) at level 2 establishments, and 312 (50.2%) at level 3 establishments. A total of 535 (86.0%) FSWs came from Guangxi. Most were of Han or Zhuang ethnic origin (Table 1). Few respondents had attended high school, and most were older than 25 years. Age increased with level (trend test $\chi^2 = 106.641$; $P < 0.001$), as did the proportion of FSWs who were married or cohabiting (trend test $\chi^2 = 217.699$; $P < 0.001$). A regular sexual partner was reported by 359 (57.7%) FSWs. The proportion reporting a regular sexual partner increased with the level of establishment (Table 1), and the trend was significant (trend test $\chi^2 = 12.829$; $P < 0.001$).

Of the 622 participants, 7 (1.1%) were identified as HIV positive (Table 2). Only 26 (4.2%) participants reported that they had had an STI in the past year, but the screening showed that 67 (10.8%) had syphilis and 44 (7.1%) were positive for HCV antibodies. The proportion of FSWs with each of the infections was highest in level 3 establishments, but the difference was significant only for syphilis ($P < 0.001$) (Table 2). Sixteen (2.6%) FSWs had syphilis and HCV infection, and 2 (0.3%) had syphilis and HIV infection. Among the 67 participants who tested positive for syphilis, 60 (89.6%) reported that they had never had an STI.

Consistent condom use during commercial sex encounters in the past month was reported by 412 (66.2%) FSWs. Only 178 (57.1%) FSWs from level 3 establishments reported always using a condom. Overall, 21 (3.4%) FSWs overall reported never using condoms. A total of 96 (15.4%) had not used a condom in the most recent commercial sex encounter. The most common reasons for not using condoms were refusal by clients and regular clients (Table 2). Among the 359 FSWs who had regular partners, 70 (19.5%) had not used a condom during the most recent sex with their partner. This proportion is a little higher than that of FSW who did not use a condom with clients, but the difference was not significant ($\chi^2 = 2.675$; $P = 0.102$).

Table 3 shows the proportions of FSWs who responded correctly to each of the eight HIV-related knowledge questions. Overall, 442 (71.1%) participants got at least six correct answers. There was a significant difference in awareness among the three levels: 88 (88.0%) of 100 FSWs from level 1 establishments answered correctly at least six times compared with 162 (77.1%) of 210 from level 2 and 192 (61.5%) of 312 from level 3 establishments ($\chi^2 = 31.488$; $P < 0.001$). The proportion of FSWs with high awareness decreased as the level of establishment increased (trend test $\chi^2 = 31.098$; $P < 0.001$). Some participants (194, 31.2%) thought that they knew only a little about HIV. Of the 24 FSWs who reported a high degree of HIV-related knowledge, only four (16.7%) answered correctly to at least six of the HIV-related questions. A total of 501 (80.5%) FSWs thought that they were unlikely to have been infected with HIV.

Use of illicit drugs was reported by 112 (18.0%), of whom 31 (27.7%) had injected heroin previously. Approximately 45% of participants had undergone HIV testing previously (Table 4). First intercourse when younger than 18 years was reported by 345 (55.5%) FSWs. Overall, 390 (62.7%) participants had worked as a FSW for more than 12 months, and 357 (57.4%) had worked in more than one establishment. More than one client per day on average was reported by 340 (54.7%) FSWs, and 190 (30.5%) had three or more clients daily (Table 4).

Significant variables in the univariate analysis were entered into the multivariate logistic regression model for inconsistent condom use (Table 5). Inconsistent condom use was significantly more likely in FSWs working in level 3 establishments than in those working in level 1 establishments ($P = 0.045$). Other significant risk factors in the multivariate analysis were a regular partner ($P = 0.012$) and illicit drug use ($P = 0.006$). High awareness of HIV ($P < 0.001$) and a previous HIV test ($P = 0.001$) were significant protective factors.

4. Discussion

In the present study, the prevalences of HIV and HCV infections and syphilis among FSWs were high, whereas the rates of condom use