# CHARACTERISTICS AND FACTORS INFLUENCING UNPROTECTED ANAL INTERCOURSE AMONG MEN WHO HAVE SEX WITH MEN IN FUYANG, CHINA

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**Abstract.** Men who have sex with men (MSM) are at risk for contracting human immunodeficiency virus (HIV) infection. The objective of this study was to explore the characteristics and factors influencing unprotected anal intercourse (UAI) among MSM in Fuyang, China in order to develop an intervention program to prevent the spread of HIV infection among MSM. We conducted this cross sectional study among 413 MSM in 2013. Participants completed an interviewer-administered questionnaire and were tested for HIV and syphilis infections. Three hundred fifty of 413 subjects reported sexual activity with a male partner during the previous 6 months; of these 27 (7.7%) had unprotected sex. Forty-four subjects had sex with a female partner during the previous 6 months; of these 25 (58.1%) had unprotected sex. The frequency of having unprotected sex with a female was significantly greater than with a male ($\chi^2$=84.52, $p$<0.001). Multivariate logistic analysis showed education level (OR=0.45, $p$=0.003), length of time of current residence (OR=0.47, $p$=0.014), knowledge about HIV infection (OR=0.09, $p$=0.022) and integrated interventions (OR=0.32, $p$<0.001) were all significantly associated with UAI. High-risk sex behavior was common among the study population. A targeted interventions needs to be developed urgently.

**Keywords:** men who have sex with men, unprotected anal intercourse, influencing factors, acquired immunodeficiency syndrome, China

## INTRODUCTION

Human immunodeficiency virus (HIV) infection/ acquired immune deficiency syndrome (AIDS) is a leading cause of death and disability worldwide (Lozano *et al*, 2012; Ortblad *et al*, 2013). The World Health Organization (WHO) estimates during 2013 there were 1.8 million new HIV infections, 29.2 million prevalent HIV cases and 1.3 million HIV deaths worldwide (Murray *et al*, 2014). Despite decades of research and community, medical, and public health efforts, the prevalence of HIV infections among men having sex with men (MSM) is high throughout the world (Beyrer *et al*, 2010). In many high-income countries, such as Australia, France, the United Kingdom

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(UK), and the United States (US), the incidence of new HIV cases among MSM is declining (CDC, 2010). HIV infection easily spread among MSM who do not use protective measures (Deya *et al*, 2014).

During the past decade, the epidemiology of HIV in China has changed from predominantly being driven by injection drug use and unsafe plasma collection to unprotected sex (Lu *et al*, 2006). By the end of June 2013, a joint assessment reported by the People's Republic of China National Health and Family Planning Commission showed there were nearly 416,000 people living with HIV/AIDS (PLWHA), 20.9% of whom were infected through homosexual transmission (NCAIDS and China CDC, 2013). Men who have sex with men were more than twice as likely as heterosexually exposed people to be infected with multiple HIV viruses (Li *et al*, 2010). A study from northeastern China found HIV infection was associated with educational backgrounds (Shao *et al*, 2014). There are important factors associated with HIV transmission among MSM including receptive anal intercourse and multiple partners in this population (Beyrer *et al*, 2012).

Unprotected anal intercourse (UAI) might have played a key role in the spread of HIV among MSM (Zhong *et al*, 2014). Men who have unprotected sexual behavior have the highest risk for HIV spread (Yang *et al*, 2010). UAI is practiced more often in regular partnerships than in casual known or anonymous ones (Matser *et al*, 2014). Intimacy in partnerships influences the decision to practice UAI (Starks *et al*, 2013). Reducing the number of male sexual partners may limit the risk of transmission in this population, but this approach is more difficult to implement than increasing condom use (Zhang *et al*, 2010). So in this study, we evaluated the factors influencing UAI among MSM in Fuyang, China. This information may help in the development of effective interventions to decrease the prevalence of HIV infection among MSM.

## MATERIALS AND METHODS

### Participant recruitment

This study was approved by the Ethics committee of Wannan Medical College. Participants were MSM who worked, studied or lived in Fuyang, were at least 16 years old, had at least one episode of sexual intercourse with another man during their life and were able and willing to provide written informed consent. Parental consent was obtained for participants aged <18 years. Since sexual orientation and sexual behavior may not always be congruent, the term "MSM" in this study applied only to sexual behavior and was distinct from sexual orientation.

Subjects were recruited in three ways: recruitment from venues frequented by MSM divided into two categories: bars, nightclubs, ka houses, baths and saunas and from public places, toilets and parks. Subjects were also recruited using snowball sampling and via networks.

Four hundred thirteen subjects participated in this survey. Forty-five point eight percent were recruited via the internet and another 45.3% were recruited by referral, 7.71% were recruited from bars and 1.25% from a park.

Participants completed a questionnaire administered by trained interviewers. Information recorded included demographic characteristics, knowledge of HIV relevant information (*eg*, "do mosquito bites spread HIV/AIDS? "), HIV related risk behavior (*eg*, "have you had conducted unprotected anal intercourse with a male or female during the past six

months? "), use of community services (*eg*, "have you received free condoms or peers education? "), and results of previous HIV testing. Subjects in this study were encouraged to refer male partners for potential enrollment, until the study sample size was large enough. Each participant gave written informed consent prior to participation. Participants were tested for HIV using an enzyme-linked immunosorbent assay (ELISA); positive results were confirmed with a western blot (WB) test for HIV. Paticipants were also tested for syphilis with the rapid plasma reagin (RPR) test; positive results were confirmed with Treponema pallidum agglutination (TPPA) test.

**Statistical analysis**

Questionnaire data were double entered into EpiData 3.1 software (SPSS version 13.0; SPSS, Chicago, IL) was used to analyze the data. Non-normally distributed continuous variables were described with medians while categorical variables were described with frequencies and percentages. The frequency of condom use among MSM during the previous 6 months was examined separately for homosexual behavior and heterosexual behavior, with significant differences assessed using chi-square tests or Fisher exact test where appropriate. Logistic regression analysis was used to determine odds ratios (OR) and 95% confidence intervals (CI) to identify factors associated with UAI with male partners from variables derived from the face-to-face questionnaire items. Variables associated with items having a response rate of less than 50% or including at least one category that concerned less than 5% of the study sample were not included in the analyses. On the basis of these criteria, a total of 9 variables were tested. Each of these was first tested using univariate modeling. Variables with a $p$-value <0.05 were considered eligible for the multivariate analysis. A step-wise procedure based on the Wald test was used to select significant variables for the multivariate model. For all analyses, a two side $p$-value < 0.05 was considered statistically significant.

## RESULTS

**Demographic characteristics**

Sixty-eight point three percent of participants were aged 20-30 years (Table 1). A total of 76.5% of participants had an education level at or above senior high school. Ninety-six point eight percent were local residents. More than 50% of participants had lived there for at least two years. Seventy-seven point seven percent of the respondents were single and 18.4% were married to someone of the opposite sex.

Thirty-five point seven percent of participants had used condom distribution and HIV counseling and testing service available (Table 1). Twelve participants had used drug maintenance therapy and participated in a needle exchange program.

**Patterns of sexual behavior**

Three hundred fifty participants (84.8)% reported having anal intercourse during the 6 months prior to the interview and 39 had sex with a female (Table 2). Fortheen percent had neither homosexual nor heterosexual behavior; 5 MSM had sexual intercourse with female partner.

**Condom use**

During the six months prior to this survey, 85.5% of participants admitted to homosexual behavior (Table 3). Thirty-two point four percent reported consistent condom use, 7.7% reported never using a condom and 60% reported occasional condom use. Forty-three participants re-

Table 1
Demographic characteristics of study participants ($N$=413).

| Characteristics | No. | (%) |
|---|---|---|
| Age (years) | | |
| < 20 | 33 | (8.0) |
| 20~24 | 141 | (34.1) |
| 25~30 | 141 | (34.1) |
| > 30 | 98 | (23.7) |
| Education level | | |
| Primary school or below | 16 | (3.9) |
| Junior high school | 81 | (19.6) |
| Senior high school | 176 | (42.6) |
| College or above | 140 | (33.9) |
| Residence at census | | |
| Anhui Province | 399 | (96.8) |
| Other provinces | 12 | (2.9) |
| Other countries | 1 | (0.2) |
| Marital status | | |
| Single | 321 | (77.7) |
| Married | 76 | (18.4) |
| Cohabitation | 1 | (0.2) |
| Divorced or widowed | 15 | (3.6) |
| Time living at current location (months) | | |
| <3 | 18 | (4.4) |
| 3~ | 46 | (11.1) |
| 7~ | 61 | (14.8) |
| 12~ | 81 | (19.6) |
| >24 | 207 | (50.1) |
| Recruitment site | | |
| Bar/Ballroom/Tea room/Club | 31 | (7.7) |
| Park/Public toilet/Lawn | 5 | (1.2) |
| Internet | 184 | (45.8) |
| VCT and referral | 182 | (45.3) |
| HIV/AIDS knowledge score | | |
| ≥6 | 395 | (95.6) |
| <6 | 18 | (4.4) |
| Availed of public health program | | |
| Condom distribution program/HIV counseling and testing program | 147 | (35.7) |
| Community drug therapy program/Needle exchange and distribution program | 12 | (2.9) |
| Peer education | 135 | (32.8) |

HIV, human immunodeficiency virus; AIDS, acquired immunodeficiency syndrome.

ported having sex with a female; of these 25 did not use a condom. Two participants reported homosexual behavior with a commercial sex worker; one sometimes and the other frequently. Four participants reported never using a condom when having sex with male or female. The frequency of condom use varied between

Table 2
Sexual behavior among MSM during the previous 6 months.

| Homosexual behavior | Heterosexual behavior, % (*n*) | | Total |
|---|---|---|---|
| | Yes | No | |
| Yes | 9.4 (39) | 75.3 (311) | 84.7 (350) |
| No | 1.2 (5) | 14.0 (58) | 15.3 (63) |
| Total | 10.6 (44) | 89.4 (369) | 100% (413) |

MSM, men having sex with men.

Table 3
Condom use by MSM during the previous 6 months.

| Frequency | Homosexual behavior No. (%) | Heterosexual behavior No. (%) | $\chi^2$ | *p*-value |
|---|---|---|---|---|
| Never | 27 (7.7) | 25 (58.1) | | |
| Sometimes | 209 (59.9) | 13 (30.2) | 84.52 | <0.001 |
| Every time | 113 (32.4) | 5 (11.6) | | |
| Total | 349 | 43 | | |

MSM, men having sex with men.

homosexual behavior to heterosexual behavior ($p<0.05$).

**Analysis of factors associated with UAI**

On univariate analysis (Table 4), the sociodemographic factors associated with UAI ($p<0.05$) were having a senior high school education level or higher, living locally for at least 1 year and having an AIDS knowledge score ≥ 6. Other factors associated with UAI were presence of a condom distribution program, an HIV counseling and testing program and peer education.

Multivariable logistic regression analysis (Table 5) identified having a college degree or higher level education was protective against UAI as were having at least a high school level education, living locally for at least 1 year and peer education.

## DISCUSSION

The proportion of subjects in our study who had UAI was 38.9%, higher than studies from Xi'an (21.6%), Guangzhou (26.6%) and Beijing (31.5%) (Fu *et al*, 2014; He *et al*, 2014; Huang *et al*, 2014). Nearly all demographic characteristics of the participants in our study were similar to studies in Chongqing (OuYang, *et al*, 2014) and Mianyang (Wang *et al*, 2014), in the central region of China. Some studies have found men who engage in UAI are more likely to have sex with someone whose HIV status is unknown or with someone who is HIV-infected; they were also more likely to find a sexual partner on the internet (Mayer *et al*, 2012), increasing the risk for HIV infection and other sexually transmitted diseases. Participants

Table 4
Factors associated with UAI among MSM by univariate logistic.

| Factors | β | Wald $\chi^2$ | *p*-value | OR (95%CI) |
|---|---|---|---|---|
| Age (years) | | | | |
| <20 | | | | 1.00 |
| 20~ | -0.33 | 0.62 | 0.431 | 0.72 (0.31-1.65) |
| 25~ | 0.02 | 0.00 | 0.961 | 1.02 (0.44-2.36) |
| >30 | -0.23 | 0.27 | 0.605 | 0.80 (0.33-1.90) |
| Education level | | | | |
| Junior high school or below | | | | 1.00 |
| Senior high school | -0.59 | 4.51 | 0.034 | 0.56 (0.32-0.96) |
| College graduate or above | -1.32 | 18.59 | <0.001 | 0.27 (0.15-4.49) |
| Marital status | | | | |
| Single | | | | 1.00 |
| Married | -0.09 | 0.10 | 0.754 | 0.91 (0.52-1.61) |
| Length of time living at current residence (months) | | | | |
| 6 | | | | 1.00 |
| 7~ | -0.45 | 1.34 | 0.248 | 0.64 (0.30-1.37) |
| 12~ | -1.18 | 9.51 | 0.002 | 0.31 (0.15-0.65) |
| >24 | -0.86 | 7.31 | 0.007 | 0.42 (0.23-0.79) |
| Participants recruitment sites | | | | |
| Bar/park | -1.00 | 0.79 | 0.374 | 0.37 (0.04-3.35) |
| Internet | | | | 1.00 |
| VCT center and from referral | -0.13 | 0.35 | 0.557 | 0.88 (0.57-1.36) |
| AIDS knowledge score | | | | |
| ≥6 | -3.03 | 8.35 | 0.004 | 0.05 (0.01-0.38) |
| <6 | | | | 1.00 |
| Public health services | | | | |
| Condom distribution/HIV VCT center | -1.22 | 21.72 | <0.001 | 0.30 (0.18-0.50) |
| Drug therapy center/Needle exchange program | | 0.00 | 0.981 | <0.01 (<0.01->999.99) |
| Peer education | -0.88 | 11.99 | 0.001 | 0.41 (0.25-0.68) |

HIV, human immunodeficiency virus; VCT, voluntary counseling and testing.

Table 5
Factors influencing UAI among MSM on multivariable logistic regression analysis.

| Factors | β | Wald $\chi^2$ | *p*-value | OR (95%CI) |
|---|---|---|---|---|
| Senior high school education level | -0.79 | 9.06 | 0.003 | 0.45 (0.27-0.76) |
| Time lived at current address 12~24months | -0.77 | 6.10 | 0.014 | 0.47 (0.25-0.85) |
| HIV/AIDS knowledge score | -2.42 | 5.25 | 0.022 | 0.09 (0.01-0.70) |
| Use of condom distribution program/HIV volunteer counseling and testing center | -1.13 | 17.23 | <0.001 | 0.32 (0.19-0.55) |

HIV, human immunodeficiency virus; AIDS, acquired immune deficiency syndrome.

who received services from a condom distribution program and/or voluntary HIV counseling and testing program had a lower risk of having unprotected intercourse (OR = 0.32). Condom use with receptive anal intercourse has been shown to reduce the per-contact risk of acquiring HIV infection by 78% compared with UAI (Sullivan *et al*, 2012). Regular condom use for anal sex is an important target for intervention programs and could have a significant positive influence on preventing the spread of HIV/AIDS and other sexually transmitted diseases.

In Douala, Cameroon Wan *et al* (2014), found nearly half the participants reported bisexual activity during the 6 month period prior to their survey, a much higher proportion than in our study (9.4%). Bisexual behavior may be the bridge for the transmission of HIV from MSM to women (Dodge *et al*, 2013). It is important to better understand this link and how it occurs.

Logistic regression analysis showed education level, length of time living locally, score on HIV/AIDS knowledge testing and availability of a condom distribution program were significantly associated with UAI. Results from the present study demonstrated a negative correlation between education level and the occurrence of UAI. In other words, the higher the education level of the participant, the less likely they were to have UAI. Greater HIV/AIDS knowledge was also associated with lower risk of having UAI.

Of the participants in our study, 95.6% had some knowledge regarding HIV infection and AIDS. However, 32.4% reported consistent condom use during the previous 6 months with their male partner. Reasons for this disconnect between knowledge and practice may include: changes in behavior are not just influenced by individual knowledge alone, but also by external factors such as national policies and community public opinion. Personal attitudes about health and self-control have an effect on behavior. Knowledge about HIV may not necessarily be core knowledge leading to behavior change, and may not apply to the lifestyle of MSM (Henry *et al*, 2010).

Forty-five point eight percent of participants were recruited from the network of other participants. Seven participants (1.7%) infected with HIV. Social media has increasingly become a place for MSM to meet. To mitigate these high risk encounters, health education on these websites as well as availability of voluntary HIV counseling and testing may be introduced. (Rosenberger *et al*, 2011).

This study had several limitations. First, the type of study population makes generalization to other situations difficult. Second, we obtained participants via the network of other participants rather than simple random sampling (Li and Chen, 2009), making the sample biased. Third, the majority of information was self-reported and subjected to recollection or social desirability bias. Forth, it is not possible to prove causality due to the cross-sectional nature of the study.

Despite these limitations, this study does give insight into the risk factors for UAI among MSM in the study setting. Further studies are needed to evaluate the psychological and physical health of this study population.

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