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Inconsistent condom use by male clients during anal intercourse with female sex workers (FSWs): Survey findings from three high-prevalence states of India

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Abstract

Objectives

Recent studies from India have documented varying estimates of self-reported anal intercourse (ranging 3% to 80%) by female sex workers (FSWs). However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioural survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in three of India's high-prevalence states — Andhra Pradesh, Maharashtra and Tamil Nadu.

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived

themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in three high HIV prevalence states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Keywords: clients of female sex workers, FSW, anal intercourse, condom use, HIV, STI, India, Maharashtra, Tamil Nadu, Andhra Pradesh

Word count: 2,814 (Introduction, methods, results and conclusion)

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 18] Varying estimates of anal intercourse prevalence have been documented in India, ranging from 3 to 80.[13 18 19] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients

through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs. However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods,

Data source

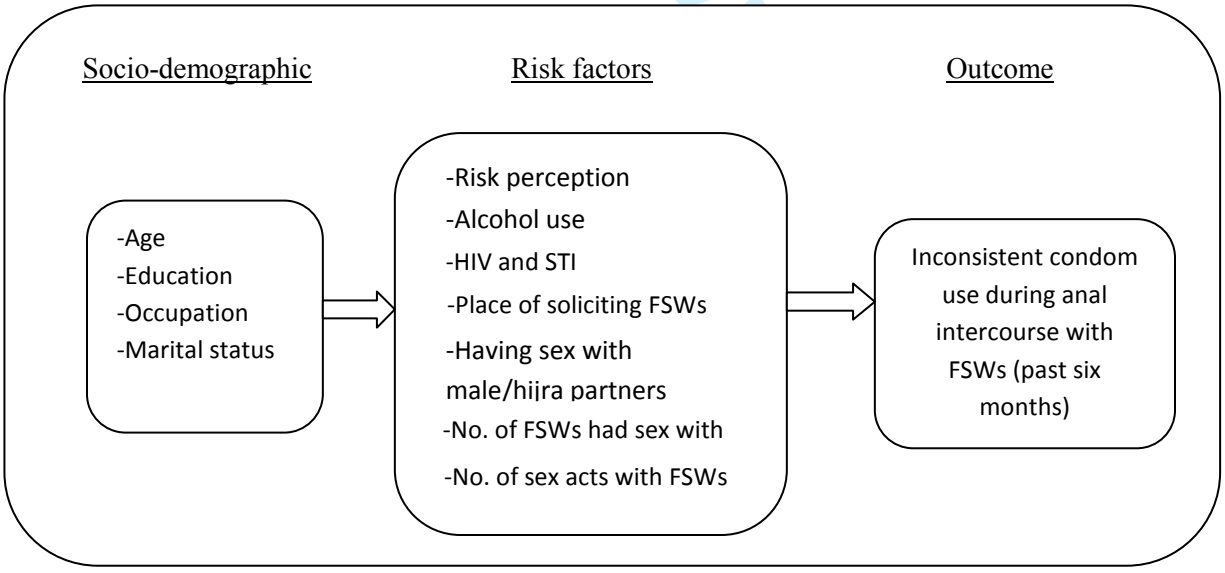
Data were derived from a cross-sectional bio-behavioural survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Figure 1: Conceptual framework of factors related with inconsistent condom use during anal intercourse



Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on

prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception (yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the

significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.4% reported having had anal intercourse in the past six months; 48.4% among them used condoms inconsistently during anal intercourse. As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 % inconsistent condom users tested positive for

HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032), employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. Our study suggests that the profile of clients who have unprotected anal intercourse varies from other clients. Clients

who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs.[13 14 18] It was apparent that there is a high demand for anal sex. When compared with the prevalence reported by previous FSW studies, the prevalence estimated by our study seems to be much lower, possibly due to the social desirability bias, which was not measured and is a major limitation for self-reported measures.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. A study by Subramanian T et.al., found inconsistent condom use during vaginal intercourse with FSWs to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[28] Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[29]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling in the past one year, primarily for work. These men also reported buying sex from FSWs. Given this scenario, it is imperative that tailored interventions be designed for those involved in manual

labor, who are often difficult to engage in prevention programs. These men could be captured through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[30] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 31] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[32] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[32-34] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 35] most AIDS prevention messages targeting heterosexuals continue to focus only on vaginal and oral sex transmission. Cultural taboos have possibly played a major role against

acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[36] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting. Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. Another limitation is that we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Given the multidirectional risk, condom promotion programs must be extended to include specific

information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

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Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

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Competing interests

None declared

Ethics approval

Clearance for the study was taken from the Protection of Human Subjects Committee (PHSC), FHI360 HQ, Washington DC, and Health Ministry Screening Committee (HMSC), Government of India.

Data sharing statement

IBBA Round 1 and Round 2 data are available at:

http://www.nari-icmr.res.in/IBBAdataaccess.php

Other IBBA-related documents are available at:

www.ibbainfo.in

Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) and condom use

Characteristics	Consistent users (n=397) % (number)	Inconsistent users (n=280) % (number)	p-value
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			
Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

Characteristics	Adjusted odds ratio (95% CI)	p-value
Age		
≤25 years	Referent	
26 years or older	2.68 (1. 09-6.61)	0.032
Education		
Illiterate	Referent	
Literate	0.66 (0.28-1.56)	0.347
Occupation		
Non-laborer (student/business/service)	Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	2.43 (1.21-4.90)	0.013
Marital status		
Never married/widowed/separated /divorced	Referent	
Currently married	0.32 (0.13-0.80)	0.015
Place solicited FSWs		
Non-public place (brothel/home/lodge/dhaba)	Referent	
Public place	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month		
≤3 FSWs	Referent	
≥ 4 FSWs and above	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month		
≤ 4 times	Referent	
≥ 5 and above	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV		
No	Referent	
Yes	4.82 (1.91-12.14)	0.001
Alcohol user		
Infrequent drinker	Referent	
Frequent drinker (everyday)	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra		
No	Referent	
Yes	0.76 (0.39-1.50)	0.440
Any HIV/STIs		
Negative	Referent	
Positive	0.73 (0.25-2.12)	0.568

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3-4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	3	State specific objectives, including any pre-specified hypotheses	7,9
Methods			
Study design	4	Present key elements of study design early in the paper	7,8,9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7,8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7,8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	9,10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	9,10
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	-
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10,11
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10,11
		(*b*) Describe any methods used to examine subgroups and interactions	-
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	-
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	11, 12
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	11, 12
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	11, 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11, 12
		(*b*) Report category boundaries when continuous variables were categorized	-
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	12, 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15, 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	15, 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Inconsistent condom use by male clients during anal intercourse with female sex workers (FSWs): Survey findings from three high-prevalence states of India

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Abstract

Objectives

Recent studies from India have documented varying estimates of self-reported anal intercourse (ranging 3% to 80%) by female sex workers (FSWs). However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioural survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in three of India's high-prevalence states — Andhra Pradesh, Maharashtra and Tamil Nadu.

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived

themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in three high HIV prevalence states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 18] Varying estimates of anal intercourse prevalence have been documented in India, ranging from 3 to 80.[13 18 19] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients

through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs. However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods

Data source

Data were derived from a cross-sectional bio-behavioural survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception

(yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.4% reported having had anal intercourse in the past six months; 48.4% among them used condoms inconsistently during anal intercourse. In Andhra Pradesh, Maharashtra and Tamil Nadu those reporting anal sex were 19.1%, 6.6% and 17.7% respectively (Data not shown in table). Condom use during anal and vaginal sex varied widely in the different states. 75.5% clients in Andhra Pradesh, 16.2% in Maharashtra and 8.2% in Tamil Nadu reported using condoms consistently during anal sex with FSW. In contrast, the reported condom use during vaginal sex was nearly 50% in Tamil Nadu, 40% in Andhra Pradesh and 10.5% in Maharashtra (Data not shown in table).

As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 % inconsistent condom users tested positive for HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032),

employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. The profile of clients who reported having unprotected anal intercourse with FSW varied from clients who did not report unprotected sex. Clients who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs.[13 14 18] It was apparent that there is a high demand for anal sex. When compared with the prevalence reported by previous FSW studies, the prevalence estimated in the current analysis seems to be much lower. Anal sex is certainly stigmatized among FSWs and they have a reason to under report condom use. However, we don't know if it is similar for men and this was not measured and is a major limitation.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. Inconsistent condom use during vaginal intercourse with FSWs was found to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[28] It could also be plausible that inability of the older men to maintain erections may have resulted in inconsistent use of condoms during anal sex when compared to younger men. Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[29]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling in the past one year, primarily for work. These men also reported buying sex from FSWs. Given

this scenario, it is imperative that tailored interventions be designed for those involved in manual labor, who are often difficult to engage in prevention programs. These men could be captured through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[30] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 31] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[32] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[32-34] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 35] most AIDS prevention messages targeting heterosexuals continue to focus only on

vaginal and oral sex transmission. Cultural taboos have possibly played a major role against acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[36] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8] Another important aspect is the condom negotiating ability of sex workers with clients. Factors in the physical, economic and policy environment influence condom use. In addition, the gendered power dynamics and the lack of choice sex workers have with heterosexual anal intercourse exacerbates their vulnerability. Sex workers need to be empowered to negotiate condom use with clients and motivate unwilling clients to use condoms during anal/vaginal sex.[37]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting. Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. Another limitation is that the analysis included only those clients who having reported anal sex which is a small fraction of the total number of clients. Further, we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Also, the survey did not gather information on violence/coercion during

anal sex. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Interventions also need to address factors that influence condom negotiation ability of sex workers. Given the multidirectional risk, condom promotion programs must be extended to include specific information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

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Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

Competing interests

None declared

Data sharing statement

IBBA Round 1 (2005-07) and Round 2 (2009-2010) data are available on request from the National AIDS Research Institute (NARI). The request form can be accessed from:

http://www.nari-icmr.res.in/pdf/IBBA/Agreement-for-accessing-raw-IBBA%20_R1-&-R2_data.pdf

Other IBBA-related documents are available at:

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Ethics approval

Clearance for the study was taken from ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

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Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) with occasional and regular FSWs and condom use

Characteristics	Consistent condom users (n=397, 51.5%) % (number)	Inconsistent condom users (n=280, 48.4%) % (number)	p-value
State			
Andhra Pradesh	75.5(281)	18.2(58)	0.000
Tamil Nadu	8.2(43)	48.0(84)	
Maharashtra	16.2(73)	33.7(138)	
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			

Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

Characteristics	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age				
≤25 years	Referent		Referent	
26 years or older	2.00 (0.74-5.40)	0.170	2.68 (1. 09-6.61)	0.032
Education				
Illiterate	Referent		Referent	
Literate	0.17 (0.05-0.59)	0.005	0.66 (0.28-1.56)	0.347
Occupation				
Non-laborer (student/business/service)	Referent		Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	1.23 (0.33-4.48)	0.749	2.43 (1.21-4.90)	0.013
Marital status				
Never married/widowed/separated /divorced	Referent		Referent	
Currently married	1.69 (0.66-4.31)	0.269	0.32 (0.13-0.80)	0.015
Place solicited FSWs				
Non-public place (brothel/home/lodge/dhaba)	Referent		Referent	
Public place	1.49 (0.52-4.20)	0.449	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month				
≤3 FSWs	Referent		Referent	
≥ 4 FSWs and above	0.41 (0.14-1.16)	0.094	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month				
≤ 4 times	Referent		Referent	
≥ 5 and above	0.88 (0.32-2.41)	0.812	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV				
No	Referent		Referent	
Yes	11.99 (3.08-46.5)	0.000	4.82 (1.91-12.14)	0.001
Alcohol user				
Infrequent drinker	Referent		Referent	
Frequent drinker (everyday)	2.11 (1.06-4.20)	0.033	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra				
No	Referent		Referent	
Yes	0.35 (0.14-0.87)	0.025	0.76 (0.39-1.50)	0.440
Any HIV/STIs				

Negative	Referent		Referent	
Positive	4.42 (0.74-26.32)	0.102	0.73 (0.25-2.12)	0.568

Title: Inconsistent condom use by male clients during anal intercourse with female sex workers (FSWs): Survey findings from three high-prevalence states of India

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Competing interests

None declared

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Ethics approval

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Data sharing statement

IBBA Round 1 (2005-07) and Round 2 (2009-2010) data are available on request from the National AIDS Research Institute (NARI). The request form can be accessed from:

http://www.nari-icmr.res.in/pdf/IBBA/Agreement-for-accessing-raw-IBBA%20_R1-&-R2_data.pdf

Other IBBA-related documents are available at:

www.ibbainfo.in

Abstract

Objectives

Recent studies from India have documented varying estimates of self-reported anal intercourse (ranging 3% to 80%) by female sex workers (FSWs). However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioural survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this

behavior in three of India's high-prevalence states — Andhra Pradesh, Maharashtra and Tamil Nadu.

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in three high HIV prevalence states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 18] Varying estimates of anal intercourse prevalence have been documented in India, ranging from 3 to 80.[13 18 19] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients

through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs. However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods

Data source

Data were derived from a cross-sectional bio-behavioural survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception

(yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.4% reported having had anal intercourse in the past six months; 48.4% among them used condoms inconsistently during anal intercourse. In Andhra Pradesh, Maharashtra and Tamil Nadu those reporting anal sex were 19.1%, 6.6% and 17.7% respectively (Data not shown in table). Condom use during anal and vaginal sex varied widely in the different states. 75.5% clients in Andhra Pradesh, 16.2% in Maharashtra and 8.2% in Tamil Nadu reported using condoms consistently during anal sex with FSW. In contrast, the reported condom use during vaginal sex was nearly 50% in Tamil Nadu, 40% in Andhra Pradesh and 10.5% in Maharashtra (Data not shown in table).

As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 % inconsistent condom users tested positive for HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032),

employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. The profile of clients who reported having unprotected anal intercourse with FSW varied from clients who did not report unprotected sex. Clients who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs.[13 14 18] It was apparent that there is a high demand for anal sex. When compared with the prevalence reported by previous FSW studies, the prevalence estimated in the current analysis seems to be much lower. Anal sex is certainly stigmatized among FSWs and they have a reason to under report condom use. However, we don't know if it is similar for men and this was not measured and is a major limitation.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. Inconsistent condom use during vaginal intercourse with FSWs was found to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[28] It could also be plausible that inability of the older men to maintain erections may have resulted in inconsistent use of condoms during anal sex when compared to younger men. Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[29]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling in the past one year, primarily for work. These men also reported buying sex from FSWs. Given

this scenario, it is imperative that tailored interventions be designed for those involved in manual labor, who are often difficult to engage in prevention programs. These men could be captured through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[30] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 31] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[32] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[32-34] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 35] most AIDS prevention messages targeting heterosexuals continue to focus only on

vaginal and oral sex transmission. Cultural taboos have possibly played a major role against acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[36] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8] Another important aspect is the condom negotiating ability of sex workers with clients. Factors in the physical, economic and policy environment influence condom use. In addition, the gendered power dynamics and the lack of choice sex workers have with heterosexual anal intercourse exacerbates their vulnerability. Sex workers need to be empowered to negotiate condom use with clients and motivate unwilling clients to use condoms during anal/vaginal sex.[37]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting. Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. Another limitation is that the analysis included only those clients who having reported anal sex which is a small fraction of the total number of clients. Further, we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Also, the survey did not gather information on violence/coercion during

anal sex. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Interventions also need to address factors that influence condom negotiation ability of sex workers. Given the multidirectional risk, condom promotion programs must be extended to include specific information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

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Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) with occasional and regular FSWs and condom use

Characteristics	Consistent condom users (n=397, 51.5%) % (number)	Inconsistent condom users (n=280, 48.4%) % (number)	p-value
State			
Andhra Pradesh	75.5(281)	18.2(58)	0.000
Tamil Nadu	8.2(43)	48.0(84)	
Maharashtra	16.2(73)	33.7(138)	
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			

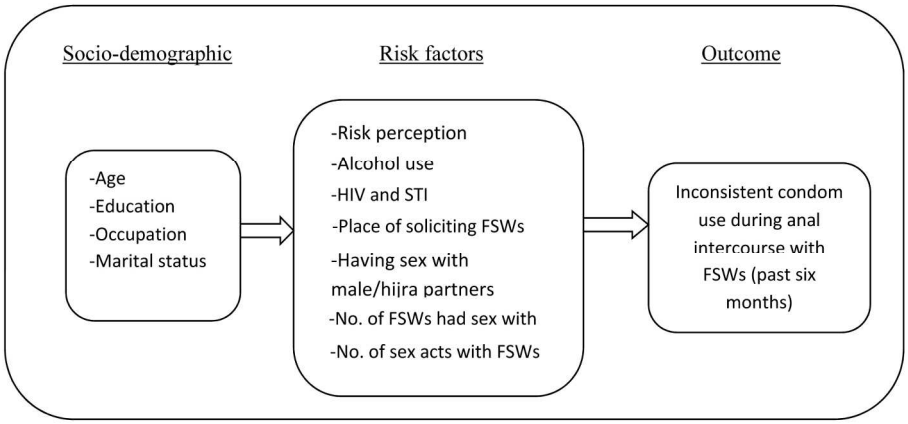
Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

Characteristics	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age				
≤25 years	Referent		Referent	
26 years or older	2.00 (0.74-5.40)	0.170	2.68 (1. 09-6.61)	0.032
Education				
Illiterate	Referent		Referent	
Literate	0.17 (0.05-0.59)	0.005	0.66 (0.28-1.56)	0.347
Occupation				
Non-laborer (student/business/service)	Referent		Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	1.23 (0.33-4.48)	0.749	2.43 (1.21-4.90)	0.013
Marital status				
Never married/widowed/separated /divorced	Referent		Referent	
Currently married	1.69 (0.66-4.31)	0.269	0.32 (0.13-0.80)	0.015
Place solicited FSWs				
Non-public place (brothel/home/lodge/dhaba)	Referent		Referent	
Public place	1.49 (0.52-4.20)	0.449	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month				
≤3 FSWs	Referent		Referent	
≥ 4 FSWs and above	0.41 (0.14-1.16)	0.094	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month				
≤ 4 times	Referent		Referent	
≥ 5 and above	0.88 (0.32-2.41)	0.812	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV				
No	Referent		Referent	
Yes	11.99 (3.08-46.5)	0.000	4.82 (1.91-12.14)	0.001
Alcohol user				
Infrequent drinker	Referent		Referent	
Frequent drinker (everyday)	2.11 (1.06-4.20)	0.033	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra				
No	Referent		Referent	
Yes	0.35 (0.14-0.87)	0.025	0.76 (0.39-1.50)	0.440
Any HIV/STIs				

Negative	Referent		Referent	
Positive	4.42 (0.74-26.32)	0.102	0.73 (0.25-2.12)	0.568

Figure 1: Conceptual framework of factors related with inconsistent condom use during anal intercourse



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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3-4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	3	State specific objectives, including any pre-specified hypotheses	7,9
Methods			
Study design	4	Present key elements of study design early in the paper	7,8,9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7,8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7,8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	9,10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	9,10
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	-
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10,11
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10,11
		(*b*) Describe any methods used to examine subgroups and interactions	-
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	-
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	11, 12
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	11, 12
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	11, 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11, 12
		(*b*) Report category boundaries when continuous variables were categorized	-
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	12, 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15, 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	15, 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Inconsistent condom use by male clients during anal intercourse with occasional and regular female sex workers (FSWs): Survey findings from southern states of India

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Abstract

Objectives

Recent studies from India have documented varying estimates of self-reported anal intercourse (ranging 3% to 80%) by female sex workers (FSWs). However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioural survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in India's high-prevalence southern states (Andhra Pradesh, Maharashtra and Tamil Nadu combined).

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in high HIV prevalent southern states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 18] Varying estimates of anal intercourse prevalence have been documented in India, ranging from 3 to 80.[13 18 19] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients

through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs. However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods

Data source

Data were derived from a cross-sectional bio-behavioural survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception

(yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.3% reported having had anal intercourse in the past six months; 48.4% among them used condoms inconsistently during anal intercourse. In Andhra Pradesh, Maharashtra and Tamil Nadu those reporting anal sex were 18.9%, 6.5% and 17.7% respectively. Condom use during anal and vaginal sex varied widely in the different states **(Figure 2)** and since only a small proportion of clients in each of these states reported anal sex, the findings are based on an aggregate analysis. .

As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 % inconsistent condom users tested positive for HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032), employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001),

reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. The profile of clients who reported having unprotected anal intercourse with FSW varied from clients who did not report unprotected sex. Clients who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs[13 14 18 28]and the reported prevalence ranged from 11.9% to 22.0% . It was apparent from these studies that there is a high demand for anal sex (above 40.0%). When compared with the prevalence reported in these FSW studies, the prevalence estimated in the current analysis seems to be much lower. Anal sex is certainly stigmatized among FSWs and they have a reason to under report this behavior., however, we don't know if it is similar for men.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. Inconsistent condom use during vaginal intercourse with FSWs was found to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[29] It could also be plausible that inability of the older men to maintain erections may have resulted in inconsistent use of condoms during anal sex when compared to younger men. Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[30]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling

in the past one year, primarily for work. These men also reported buying sex from FSWs. Given this scenario, it is imperative that tailored interventions be designed for those involved in manual labor, who are often difficult to engage in prevention programs. These men could be captured through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[31] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 32] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[33] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[33-35] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 36] most AIDS prevention messages targeting heterosexuals continue to focus only on vaginal and oral sex transmission. Cultural taboos have possibly played a major role against acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[37] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8] Another important aspect is the condom negotiating ability of sex workers with clients. Factors in the physical, economic and policy environment influence condom use. In addition, the gendered power dynamics and the lack of choice sex workers have with heterosexual anal intercourse exacerbates their vulnerability. Sex workers need to be empowered to negotiate condom use with clients and motivate unwilling clients to use condoms during anal/vaginal sex.[38]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting. Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. Further, we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Also, the survey did not gather

information on violence/coercion during anal sex. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Interventions also need to address factors that influence condom negotiation ability of sex workers. Given the multidirectional risk, condom promotion programs must be extended to include specific information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

Competing interests

None declared

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Ethics approval

Clearance for the study was taken from ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Data sharing statement

IBBA Round 1 (2005-07) and Round 2 (2009-2010) data are available on request from the National AIDS Research Institute (NARI). The request form can be accessed from:

http://www.nari-icmr.res.in/pdf/IBBA/Agreement-for-accessing-raw-IBBA%20_R1-&-R2_data.pdf

Other IBBA-related documents are available at:

www.ibbainfo.in

Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

Figure legends

Figure 1 – Conceptual framework of factor related with inconsistent condom use during anal intercourse.

Figure 2 – Proportions of reported anal-vaginal sex and consistent condom use among male clients of regular and occasional FSWs, in Andhra Pradesh (AP), Maharashtra (MH) and Tamil Nadu (TN)

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Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) with occasional and regular FSWs and condom use

Characteristics	Consistent condom users (n=397, 51.5%) % (number)	Inconsistent condom users (n=280, 48.4%) % (number)	p-value
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			
Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

Characteristics	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age				
≤25 years	Referent		Referent	
26 years or older	2.00 (0.74-5.40)	0.170	2.68 (1. 09-6.61)	0.032
Education				
Illiterate	Referent		Referent	
Literate	0.17 (0.05-0.59)	0.005	0.66 (0.28-1.56)	0.347
Occupation				
Non-laborer (student/business/service)	Referent		Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	1.23 (0.33-4.48)	0.749	2.43 (1.21-4.90)	0.013
Marital status				
Never married/widowed/separated /divorced	Referent		Referent	
Currently married	1.69 (0.66-4.31)	0.269	0.32 (0.13-0.80)	0.015
Place solicited FSWs				
Non-public place (brothel/home/lodge/dhaba)	Referent		Referent	
Public place	1.49 (0.52-4.20)	0.449	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month				
≤3 FSWs	Referent		Referent	
≥ 4 FSWs and above	0.41 (0.14-1.16)	0.094	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month				
≤ 4 times	Referent		Referent	
≥ 5 and above	0.88 (0.32-2.41)	0.812	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV				
No	Referent		Referent	
Yes	11.99 (3.08-46.5)	0.000	4.82 (1.91-12.14)	0.001
Alcohol user				
Infrequent drinker	Referent		Referent	
Frequent drinker (everyday)	2.11 (1.06-4.20)	0.033	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra				
No	Referent		Referent	
Yes	0.35 (0.14-0.87)	0.025	0.76 (0.39-1.50)	0.440
Any HIV/STIs				
Negative	Referent		Referent	
Positive	4.42 (0.74-26.32)	0.102	0.73 (0.25-2.12)	0.568

Title: Inconsistent condom use by male clients during anal intercourse with occasional and regular female sex workers (FSWs): Survey findings from southern ~~three high prevalence~~ states of India

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Competing interests

None declared

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Ethics approval

Clearance for the study was taken from ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Data sharing statement

IBBA Round 1 (2005-07) and Round 2 (2009-2010) data are available on request from the National AIDS Research Institute (NARI). The request form can be accessed from:

http://www.nari-icmr.res.in/pdf/IBBA/Agreement-for-accessing-raw-IBBA%20_R1-&-R2_data.pdf

Other IBBA-related documents are available at:

www.ibbainfo.in

Abstract

Objectives

Recent studies from India have documented varying estimates of self-reported anal intercourse (ranging 3% to 80%) by female sex workers (FSWs). However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioural survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in ~~three of~~ India's high-prevalence southern states (~~—~~ Andhra Pradesh, Maharashtra and Tamil Nadu combined).

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived

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themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in ~~three~~ high HIV prevalen~~tee~~ southern states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 18] Varying estimates of anal intercourse prevalence have been documented in India, ranging from 3 to 80.[13 18 19] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients

through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs. However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods

Data source

Data were derived from a cross-sectional bio-behavioural survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception

(yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.34% reported having had anal intercourse in the past six months; 48.4% among them used condoms inconsistently during anal intercourse. In Andhra Pradesh, Maharashtra and Tamil Nadu those reporting anal sex were 19.18.9%, 6.56% and 17.7% respectively (Data not shown in table). Condom use during anal and vaginal sex varied widely in the different states (Figure 2) and since only a small proportion of clients in each of these states reported anal sex, the findings are based on an aggregate analysis. 75.5% clients in Andhra Pradesh, 16.2% in Maharashtra and 8.2% in Tamil Nadu reported using condoms consistently during anal sex with FSW. In contrast, the reported condom use during vaginal sex was nearly 50% in Tamil Nadu, 40% in Andhra Pradesh and 10.5% in Maharashtra (Data not shown in table).

As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 %

inconsistent condom users tested positive for HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032), employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. The profile of clients

who reported having unprotected anal intercourse with FSW varied from clients who did not report unprotected sex. Clients who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs[13 14 18 28] and the reported prevalence ranged from 11.9% to 22.0% . It was apparent from these studies that there is a high demand for anal sex (above 40.0%). When compared with the prevalence reported ~~by~~ in these ~~previous~~ FSW studies, the prevalence estimated in the current analysis seems to be much lower. Anal sex is certainly stigmatized among FSWs and they have a reason to under report this behavior~~condom use~~., ~~H~~however, we don't know if it is similar for men~~ and this was not measured and is a major limitation~~.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. Inconsistent condom use during vaginal intercourse with FSWs was found to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[29] It could also be plausible that inability of the older men to maintain erections may have resulted in inconsistent use of condoms during anal sex when compared to younger men. Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[30]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling in the past one year, primarily for work. These men also reported buying sex from FSWs. Given this scenario, it is imperative that tailored interventions be designed for those involved in manual labor, who are often difficult to engage in prevention programs. These men could be captured through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[31] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 32] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[33] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in

anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[33-35] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 36] most AIDS prevention messages targeting heterosexuals continue to focus only on vaginal and oral sex transmission. Cultural taboos have possibly played a major role against acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[37] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8] Another important aspect is the condom negotiating ability of sex workers with clients. Factors in the physical, economic and policy environment influence condom use. In addition, the gendered power dynamics and the lack of choice sex workers have with heterosexual anal intercourse exacerbates their vulnerability. Sex workers need to be empowered to negotiate condom use with clients and motivate unwilling clients to use condoms during anal/vaginal sex.[38]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting.

Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. ~~Another limitation is that the analysis included only those clients who having reported anal sex which is a small fraction of the total number of clients.~~ Further, we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Also, the survey did not gather information on violence/coercion during anal sex. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Interventions also need to address factors that influence condom negotiation ability of sex workers. Given the multidirectional risk, condom promotion programs must be extended to include specific information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

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Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) with occasional and regular FSWs and condom use

Characteristics	Consistent condom users (n=397, 51.5%) % (number)	Inconsistent condom users (n=280, 48.4%) % (number)	p-value
~~State~~			
~~Andhra Pradesh~~	~~75.5(281)~~	~~18.2(58)~~	~~0.000~~
~~Tamil Nadu~~	~~8.2(43)~~	~~48.0(84)~~	
~~Maharashtra~~	~~16.2(73)~~	~~33.7(138)~~	
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			

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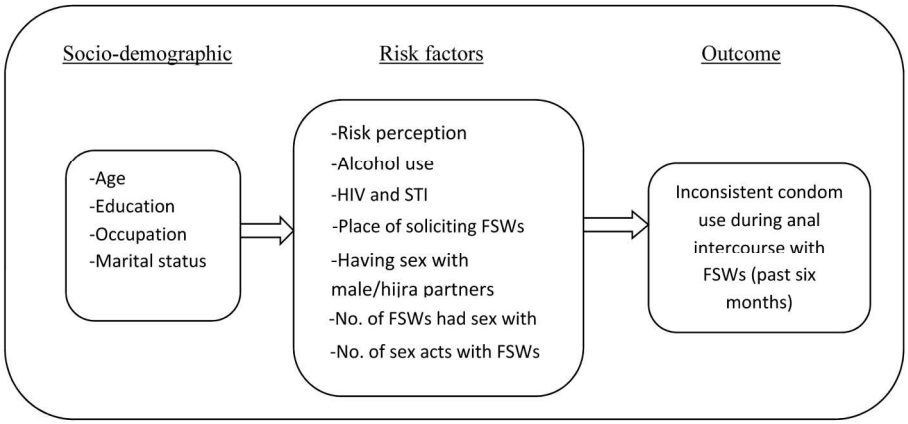
Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

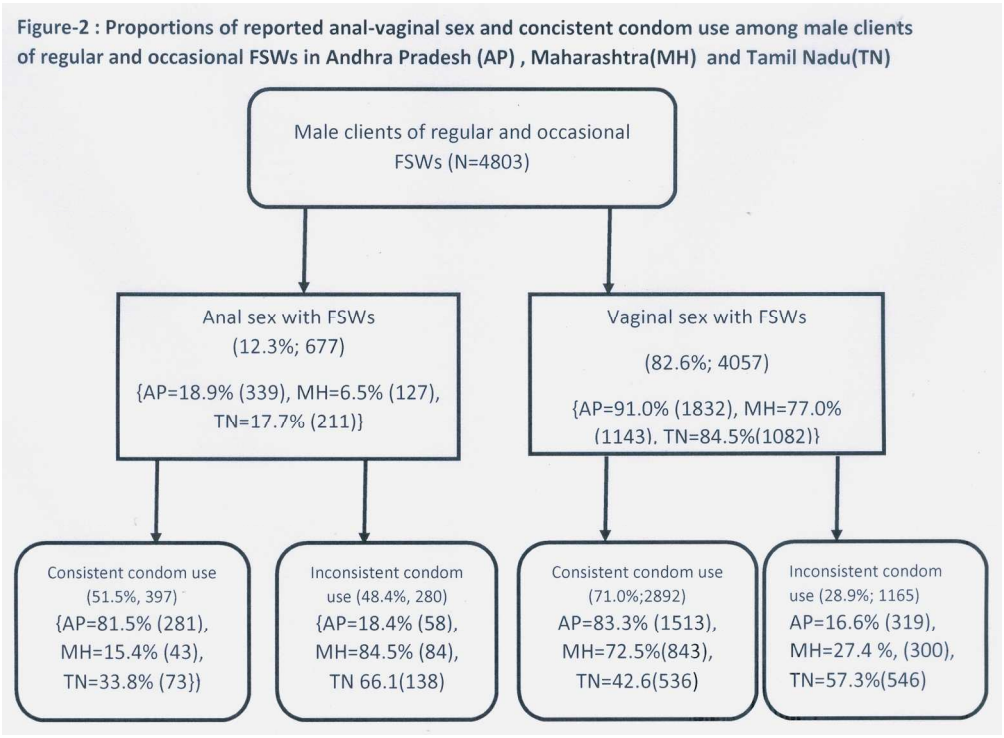
Characteristics	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age				
≤25 years	Referent		Referent	
26 years or older	2.00 (0.74-5.40)	0.170	2.68 (1. 09-6.61)	0.032
Education				
Illiterate	Referent		Referent	
Literate	0.17 (0.05-0.59)	0.005	0.66 (0.28-1.56)	0.347
Occupation				
Non-laborer (student/business/service)	Referent		Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	1.23 (0.33-4.48)	0.749	2.43 (1.21-4.90)	0.013
Marital status				
Never married/widowed/separated /divorced	Referent		Referent	
Currently married	1.69 (0.66-4.31)	0.269	0.32 (0.13-0.80)	0.015
Place solicited FSWs				
Non-public place (brothel/home/lodge/dhaba)	Referent		Referent	
Public place	1.49 (0.52-4.20)	0.449	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month				
≤3 FSWs	Referent		Referent	
≥ 4 FSWs and above	0.41 (0.14-1.16)	0.094	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month				
≤ 4 times	Referent		Referent	
≥ 5 and above	0.88 (0.32-2.41)	0.812	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV				
No	Referent		Referent	
Yes	11.99 (3.08-46.5)	0.000	4.82 (1.91-12.14)	0.001
Alcohol user				
Infrequent drinker	Referent		Referent	
Frequent drinker (everyday)	2.11 (1.06-4.20)	0.033	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra				
No	Referent		Referent	
Yes	0.35 (0.14-0.87)	0.025	0.76 (0.39-1.50)	0.440
Any HIV/STIs				

Negative	Referent		Referent	
Positive	4.42 (0.74-26.32)	0.102	0.73 (0.25-2.12)	0.568

Figure 1: Conceptual framework of factors related with inconsistent condom use during anal intercourse



179x98mm (300 x 300 DPI)



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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3-4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	3	State specific objectives, including any pre-specified hypotheses	7,9
Methods			
Study design	4	Present key elements of study design early in the paper	7,8,9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7,8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7,8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	9,10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	9,10
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	-
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10,11
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10,11
		(*b*) Describe any methods used to examine subgroups and interactions	-
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	-
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	11, 12
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	11, 12
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	11, 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11, 12
		(*b*) Report category boundaries when continuous variables were categorized	-
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	12, 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15, 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	15, 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Inconsistent condom use by male clients during anal intercourse with occasional and regular female sex workers (FSWs): Survey findings from southern states of India

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Word count: 3004 (Introduction, methods, results and conclusion)

Abstract

Objectives

Self-reported anal intercourse by female sex workers (FSWs) documented in recent studies from India range between 11.9% and 22.0%. However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioral survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in India's high-prevalence southern states (Andhra Pradesh, Maharashtra and Tamil Nadu combined).

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived

themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in high HIV prevalent southern states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 1819] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs.

However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods

Data source

Data were derived from a cross-sectional bio-behavioral survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical

Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception (yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.3% reported having had anal intercourse in the past six months; 48.4%

among them used condoms inconsistently during anal intercourse. In Andhra Pradesh, Maharashtra and Tamil Nadu those reporting anal sex were 18.9%, 6.5% and 17.7% respectively. Condom use during anal and vaginal sex varied widely in the different states **(Figure 2)** and since only a small proportion of clients in each of these states reported anal sex, the findings are based on an aggregate analysis. .

As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 % inconsistent condom users tested positive for HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032), employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were

currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. The profile of clients who reported having unprotected anal intercourse with FSW varied from clients who did not report unprotected sex. Clients who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs[13 14 18 28] and the reported prevalence ranged from 11.9% to 22.0% . It was apparent from these studies that there is a high demand for anal sex from male clients of FSWs (above 40.0%). When compared with the prevalence

reported by FSWs in these studies, the prevalence reported by clients in the current analysis is comparable and an almost similar prevalence was reported by FSWs in round one of IBBA[28] . Anal sex is certainly stigmatized among FSWs and they have a reason to under report this behavior, however, we don't know if it is similar for men.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. Inconsistent condom use during vaginal intercourse with FSWs was found to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[29] It could also be plausible that inability of the older men to maintain erections may have resulted in inconsistent use of condoms during anal sex when compared to younger men. Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[30]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling in the past one year, primarily for work. These men also reported buying sex from FSWs. Given this scenario, it is imperative that tailored interventions be designed for those involved in manual labor, who are often difficult to engage in prevention programs. These men could be captured

through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[31] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 32] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[33] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[33-35] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 36] most AIDS prevention messages targeting heterosexuals continue to focus only on vaginal and oral sex transmission. Cultural taboos have possibly played a major role against acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and

youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[37] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8] Another important aspect is the condom negotiating ability of sex workers with clients. Factors in the physical, economic and policy environment influence condom use. In addition, the gendered power dynamics and the lack of choice sex workers have with heterosexual anal intercourse exacerbates their vulnerability. Sex workers need to be empowered to negotiate condom use with clients and motivate unwilling clients to use condoms during anal/vaginal sex.[38]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting. Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. Further, we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Also, the survey did not gather information on violence/coercion during anal sex. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Interventions also need to address factors that influence condom negotiation ability of sex workers. Given the multidirectional risk, condom promotion programs must be extended to include specific information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

Competing interests

None declared

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Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

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Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) with occasional and regular FSWs and condom use

Characteristics	Consistent condom users (n=397, 51.5%) % (number)	Inconsistent condom users (n=280, 48.4%) % (number)	p-value
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			
Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

Characteristics	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age				
≤25 years	Referent		Referent	
26 years or older	2.00 (0.74-5.40)	0.170	2.68 (1. 09-6.61)	0.032
Education				
Illiterate	Referent		Referent	
Literate	0.17 (0.05-0.59)	0.005	0.66 (0.28-1.56)	0.347
Occupation				
Non-laborer (student/business/service)	Referent		Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	1.23 (0.33-4.48)	0.749	2.43 (1.21-4.90)	0.013
Marital status				
Never married/widowed/separated /divorced	Referent		Referent	
Currently married	1.69 (0.66-4.31)	0.269	0.32 (0.13-0.80)	0.015
Place solicited FSWs				
Non-public place (brothel/home/lodge/dhaba)	Referent		Referent	
Public place	1.49 (0.52-4.20)	0.449	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month				
≤3 FSWs	Referent		Referent	
≥ 4 FSWs and above	0.41 (0.14-1.16)	0.094	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month				
≤ 4 times	Referent		Referent	
≥ 5 and above	0.88 (0.32-2.41)	0.812	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV				
No	Referent		Referent	
Yes	11.99 (3.08-46.5)	0.000	4.82 (1.91-12.14)	0.001
Alcohol user				
Infrequent drinker	Referent		Referent	
Frequent drinker (everyday)	2.11 (1.06-4.20)	0.033	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra				
No	Referent		Referent	
Yes	0.35 (0.14-0.87)	0.025	0.76 (0.39-1.50)	0.440
Any HIV/STIs				
Negative	Referent		Referent	
Positive	4.42 (0.74-26.32)	0.102	0.73 (0.25-2.12)	0.568

Title: Inconsistent condom use by male clients during anal intercourse with occasional and regular female sex workers (FSWs): Survey findings from southern states of India

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Abstract

Objectives

Self-reported anal intercourse by female sex workers (FSWs) documented in recent studies from India range between 11.9% and 22.0%. However, comparable data on anal intercourse and condom use from male clients of FSWs is lacking. Using data from a bio-behavioral survey (2009–2010), we examined prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in India's high-prevalence southern states (Andhra Pradesh, Maharashtra and Tamil Nadu combined).

Methods

Using two-stage time location cluster sampling, we recruited 4,803 clients of FSWs, ages 18–60 years, who had purchased sex from an FSW in the past month. After obtaining informed consent, respondents were interviewed and tested for HIV and STIs (syphilis, gonorrhea and chlamydia). Logistic regression analysis was used to identify the factors associated with inconsistent condom use during anal intercourse (in the past six months) with FSWs.

Results

Overall, 12.4% clients reported anal intercourse in the past six months, of which 48.4% used condoms inconsistently. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032); employed as manual laborers (AOR: 2.43, p=0.013); consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031) and perceived

themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse.

Conclusion

The results suggest that sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, leading to a greater risk of acquiring HIV and its further transmission to other male and female sexual partners. Given the multidirectional risk, safer sex communication on heterosexual anal intercourse must be incorporated into HIV prevention programs.

Article summary

This paper discusses the prevalence of anal intercourse, male clients' self-reported inconsistent condom use during anal intercourse with FSWs, and correlates of this behavior in Andhra Pradesh, Maharashtra and Tamil Nadu.

Key messages

- Sex workers and their clients commonly practice anal intercourse, but a relatively high proportion of clients do not consistently use condoms, resulting in a greater risk of acquiring HIV and its further transmission to other male and female sexual partners.
- Safer sex messages on heterosexual anal intercourse should be incorporated into HIV prevention interventions for both FSWs and their clients.

Strengths and limitations of this study

- Using data from a large scale multi-site bio-behavioral survey, this paper discusses the prevalence and practice of unprotected anal intercourse among clients of sex workers in high HIV prevalent southern states of India.
- Both anal intercourse and condom use are self-reported measures and may therefore be influenced by the social desirability bias, resulting in under or over reporting of the phenomena.

Introduction

Heterosexual anal intercourse (HAI) is an understudied risk behavior among clients of female sex workers (CFSWs), a vulnerable population that has been identified as a critical bridge group in HIV transmission.[1 2] HAI has thus far received little attention, even though depictions of heterosexual anal intercourse can be found in art and artifacts dating to antiquity.[3] The silence on this front is perhaps linked to society's discomfort with HAI, coupled with the notion that anal intercourse is a homosexual male practice, not heterosexual.[3 4] Most HIV transmission in India occurs through heterosexual networks[5 6], and unprotected, heterosexual transactional sex plays a central role in the spread of HIV.[7] Previous studies indicate that condom usage is higher for vaginal intercourse than for heterosexual anal sex.[8 9] Furthermore, studies have documented condom breakage when condoms were used during anal intercourse, thereby increasing chances of infection.[10-12] While behavioral interventions targeting FSWs have substantially reduced HIV prevalence in general, the FSWs' HIV and STI vulnerability remains high due to the increasing trend of risky behaviors, such as unprotected anal intercourse with clients.[13 14]

Given the high vulnerabilities associated with HAI in commercial and non-commercial sex settings, a few research studies have assessed anal intercourse prevalence and associated factors among FSWs and the general population.[15-17] Similar to findings from other countries in commercial sex settings, studies on FSWs in India have also documented increased trend for anal intercourse with clients.[13 14 1819] In India and elsewhere, the primary reason for FSWs selling anal sex is the extra money it brings from clients. It is also linked to associated factors such as economic hardship, debt status and lack of alternate source of income.[14 18] Anal intercourse is usually demand driven, not preferred by FSWs and at times even forced by clients through violence.[15 18 20 21] Both intervention and research in the area are extensive among FSWs.

However, there is paucity of behavioral research on clients' self-reported anal intercourse and condom use during anal intercourse. This paper examines the correlates of clients' inconsistent condom use during anal intercourse with FSWs. The study has used cross-sectional survey data collected from clients of FSW in three high HIV prevalence states of India.

Materials and Methods

Data source

Data were derived from a cross-sectional bio-behavioral survey (called integrated behavioral and biological assessment [IBBA]) that was conducted among clients of FSWs as part of the evaluation of a large-scale HIV prevention program in 12 districts across the three Indian states of Andhra Pradesh, Maharashtra and Tamil Nadu during 2009–2010. Men, of ages 18–60 years, who reported purchasing sex from an FSW in the past month, were considered eligible respondents. These eligible respondents were identified with the help of FSWs, brokers, pimps, etc., at places of FSW solicitation/entertainment and recruited for the study. The survey used a two-stage cluster sampling design with time location clusters (TLCs) as primary sampling units. Clusters were randomly selected by using probability proportional to size (PPS) in the first stage. From these selected clusters, respondents were then selected through systematic random sampling in the second stage. Behavioral information was collected through a structured, interviewer-administered questionnaire, and blood and urine samples were collected to test for HIV and other STIs (gonorrhea, chlamydia, syphilis). A detailed description of the survey methodology is available elsewhere.[22]

Prior oral or written informed consent was obtained from all respondents. The survey was approved by the ethics committees of the participating institutes of Indian Council of Medical

Research (National AIDS Research Institute, Pune; National Institute of Nutrition, Hyderabad; and National Institute of Epidemiology, Chennai) and FHI 360 (Protection of Human Subjects Committee).

Conceptual framework

For the current analysis, a conceptual framework (Figure 1, illustrated below) was used as a device to explain and identify the different factors that may be associated with inconsistent condom use during anal intercourse with FSWs.

Inconsistent condom use during anal intercourse was the dependent variable. The independent variables were selected based on their contextual relation with the dependent variable. Based on prior research, individual factors such as risk perception, alcohol use,[23-25] frequency of commercial sex, volume of sex acts,[14 26] having male/transgender partners,[27] place of soliciting FSWs[5] and having HIV/STIs,[18] which are widely seen to influence condom use among different high-risk population groups, were included. We hypothesized that clients who were married, consumed alcohol, solicited FSWs from public places and had a higher number of FSW partners were more likely to be inconsistent condom users. These clients were also more likely to have experienced anal sex with a man. Most current interventions for clients of FSWs are limited to condom promotion and distribution, and no intervention for FSWs or their clients currently addresses heterosexual anal intercourse, which has significant implications for HIV prevention programming.

Based on the rationale described above, we grouped the different indicators into two categories: a) socio-demographic and b) HIV-related sexual risk behaviors.

Measures

Dependent variable:

Inconsistent condom use during anal intercourse - This behavior was assessed by asking: "*How often did you use a condom while having anal intercourse with your regular and occasional FSWs in the past six months*?" The clients who reported using condoms most of the time, sometimes or never were considered inconsistent condom users (coded as '1'), while those who reported using condoms every time during anal intercourse were considered consistent condom users (coded as '0').

Independent variables:

The independent variables included age in completed years; education (illiterate, can read only, can read and write); occupation (pre-coded as unemployed, student, domestic servant, agricultural labor, non-agricultural/casual labor, skilled/semi-skilled labor, petty businessman/shop owner, large businessman/shop owner, bus/truck drivers/helpers, other transport workers, service and others); marital status (currently married, separated, divorced, widowed, never married, no answer); place of soliciting FSWs (pre-coded as bar/night club, public place, street, park, railway station, agent, brothel, hotel/lodge, home, *dhaba*, by telephone, other); number of FSWs had sex with in the past month; number of sex acts with FSWs in the past month; ever had anal intercourse with a man/transgender (yes/no); self-risk perception (yes/no); alcohol consumption (everyday, at least once a week, less than once a week, never, no answer); and having HIV or any STI (those having HIV, syphilis, gonorrhea or chlamydia were grouped into positive and the rest as negative).

Given the skewed distribution, all the variables were dichotomized for the analysis. Age was categorized into ≤25 years and 26 years or older; education was grouped into literate and illiterate; occupation into laborers (manual) and non-laborers, marital status as currently married and never married/widowed/separated/divorced; place of soliciting FSWs into public place and non-public place; number of FSWs had sex with as ≤3 FSWs and ≥4 FSWs; number of sex acts as ≤4 times and ≥5 times; and alcohol use into frequent and infrequent drinkers.

Statistical analysis

Descriptive statistics were calculated and used to measure the levels of inconsistent condom use (during anal intercourse) and other selected variables. Chi-square tests were used to assess the significance of bivariate relationships between demographic characteristics of clients and their condom use behaviour during anal intercourse. Multiple logistic regression model was used to identify factors that were independently predictive of inconsistent condom use during anal intercourse, with adjusted odds ratio calculated at a significance level less than 0.05. Statistical calculations were conducted using aggregated data of clients of FSWs from all three states, since the eligiblility critieria for repsondents and the methods of sampling and behavioural data collection were standardized and same in all the three states. Analysis was done by applying appropriate weights. At the district level, weighting was based on the cluster effect of the sample. At the aggregate level, standardized weights were calculated by combining the 12 districts. STATA/SE version 11® (Stata Corporation, College Station, TX) was used for all the analyses.

Results

Of the 4,803 clients of FSWs (Andhra Pradesh (n=2016), Tamil Nadu (n=1217), and Maharashtra (n=1570), 12.3% reported having had anal intercourse in the past six months; 48.4%

among them used condoms inconsistently during anal intercourse. In Andhra Pradesh, Maharashtra and Tamil Nadu those reporting anal sex were 18.9%, 6.5% and 17.7% respectively. Condom use during anal and vaginal sex varied widely in the different states **(Figure 2)** and since only a small proportion of clients in each of these states reported anal sex, the findings are based on an aggregate analysis. .

As presented in Table 1, the bivariate analysis shows that the majority of inconsistent condom users were ages 26 years or older (84.3%), married (79.8 %) and solicited FSWs from public places (77.1 %). Literacy levels were lower among inconsistent condom users than among consistent condom users (50.0 % vs. 85.2 %, p=0.003). Similarly, a lower proportion of inconsistent condom users reported having had anal intercourse with a man than consistent condom users (18.7 % vs. 39.4 %, p=0.022). A higher proportion of inconsistent condom users consumed alcohol frequently (56.0 % vs. 37.5%, p=0.031) and considered themselves at risk of exposure to HIV than consistent condom users (47.9 % vs.7.13 %, p=0.000). More than 30 % inconsistent condom users tested positive for HIV/STI, compared to a smaller proportion of consistent condom users (32.3 % vs. 9.7 %, p=0.085), but the association is not significant.

Table 2 shows the independent factors associated with inconsistent condom use during anal intercourse with FSWs. Clients of FSWs who were ages 26 years or older (AOR: 2.68, p=0.032), employed as manual laborers (AOR: 2.43, p=0.013), consumed alcohol (AOR: 2.63, p=0.001), reported five or more sex acts with FSWs in the past month (AOR: 2.53, p=0.031), and perceived themselves to be at higher risk for HIV (AOR: 4.82, p=0.001) were more likely to inconsistently use condoms during anal intercourse than their counterparts. On the other hand, clients who were

currently married (AOR: 0.41, p=0.056) and had sex with more number of FSWs (≥4 and above) in the past month were less likely to inconsistently use condoms during anal intercourse than those never married/separated/divorced/widowed and who had sex with less than three FSWs. Testing positive for HIV or STI was not found to be associated with inconsistency in condom use during anal intercourse. Similarly, factors such as literacy level, place where the client solicited FSWs and whether he had had anal sex with a male/hijra partner were not associated with inconsistency in condom use during anal intercourse.

Discussion

IBBA, one of the few surveys in India to study large samples of clients of FSWs, has documented the practice of unprotected anal intercourse in three high HIV prevalence states of the country. Its findings show that anal intercourse is a substantial part of the commercial sex activity in India, with about 12 percent clients reporting experience of anal intercourse and nearly half of them not using condoms during anal intercourse with FSWs. The profile of clients who reported having unprotected anal intercourse with FSW varied from clients who did not report unprotected sex. Clients who were 26 years or older, frequently used alcohol, worked as manual laborers and reported higher number of sex acts with FSWs were at an increased risk of unprotected anal intercourse.

In the absence of comparable estimates on anal intercourse from client surveys in India, we examined the estimates available from studies on FSWs[13 14 18 28] and the reported prevalence ranged from 11.9% to 22.0% . It was apparent from these studies that there is a high demand for anal sex from male clients of FSWs (above 40.0%). When compared with the prevalence

reported by FSWs in these studies, the prevalence reported by clients in the current analysis is comparable and an almost similar prevalence was reported by FSWs in round one of IBBA[28] . Anal sex is certainly stigmatized among FSWs and they have a reason to under report this behavior, however, we don't know if it is similar for men.

The finding that older clients are at a higher risk of inconsistent condom use has been reported previously. Inconsistent condom use during vaginal intercourse with FSWs was found to be significantly associated with older clients.[2] The average age of marriage for Indian men is documented to be 26 years, and a majority of men (clients of FSWs) in this sample were married. A possible explanation for this risky behavior among older men could be the need to fulfill sexual desires or experimentation, followed by the belief that paying for sex would be less troublesome and more entertaining than sexual involvement with a non-sex worker.[29] It could also be plausible that inability of the older men to maintain erections may have resulted in inconsistent use of condoms during anal sex when compared to younger men. Older men who have sex with men have also been found to practice risky sexual behavior like inconsistent condom use.[30]

Likewise, clients who were manual laborers were more likely to be inconsistent condom users, compared to those in other occupations (white collar workers). The manual laborers in the current study include agricultural and non-agricultural laborers and cultivators. It is possible that many of these men migrated for work and stay away from their families. Additional analysis was undertaken to understand this dimension better; more than 50 % respondents reported travelling in the past one year, primarily for work. These men also reported buying sex from FSWs. Given this scenario, it is imperative that tailored interventions be designed for those involved in manual labor, who are often difficult to engage in prevention programs. These men could be captured

through networks of labor contractors and migrant populations. Educational campaigns and counseling are also important to promote condom use for all partners and all types of sex.

Our study also found that clients with higher self-perceived risk for HIV were more likely to be inconsistent condom users. Such an association could be attributed to the fact that knowledge and perceptions about safe or risky sex may not be sufficient to change an individual's behavior until self-efficacy and determination in executing a behavior or action are present.[31] Studies that have used the self-efficacy model among heterosexually active students have documented that risk perceptions have no influence over condom use, as was noted in this study.[8 32] Another plausible reason could be the lack of targeted interventions for clients, which, if present, could have inculcated a sense of responsibility toward their sexual partners.

Men who consume alcohol have been found more likely to engage in unprotected sex and anal sex and have more than 10 FSW partners.[33] A similar association was observed in our study, where clients who consumed alcohol frequently and reported five or more sexual encounters were found to inconsistently use condoms during anal intercourse. It seems that the survey has been able to capture high-risk clients, who have higher volume of sex acts with FSWs, engage in anal intercourse and do not use condoms. Alcohol use and its association with HIV-related sexual risk is well documented.[33-35] HIV prevention interventions must address this important issue linked with compromise in safe sex practices/behavior. There is a clear need for HIV prevention interventions tailored to provide information on alcohol related sexual risk.

Although studies from the early 1990s have highlighted anal intercourse as a risk factor for HIV,[9 36] most AIDS prevention messages targeting heterosexuals continue to focus only on vaginal and oral sex transmission. Cultural taboos have possibly played a major role against acknowledging anal sexual practice. Research on vulnerable populations, including FSWs and

youth, indicate that the persons particularly at risk of being infected by or transmitting HIV are more likely to practice anal intercourse.[37] Furthermore, people with experience in anal intercourse have been found to take more sexual risk when engaging in vaginal intercourse than those without anal experience.[8] Another important aspect is the condom negotiating ability of sex workers with clients. Factors in the physical, economic and policy environment influence condom use. In addition, the gendered power dynamics and the lack of choice sex workers have with heterosexual anal intercourse exacerbates their vulnerability. Sex workers need to be empowered to negotiate condom use with clients and motivate unwilling clients to use condoms during anal/vaginal sex.[38]

Limitations of the study

Our study has its limitations. For one, both anal intercourse and condom use are self-reported measures and may, therefore, be influenced by the social desirability bias. As indicated by previous research, the social desirability bias gives rise to the possibility of underreporting. Given the difficulty in evaluating the magnitude of underreporting, we must be cautious in concluding that anal intercourse is practiced at relatively low rates among this population. Further, we did not have information on anal intercourse with regular female partners to establish concurrency or multidirectional risk during anal intercourse. Also, the survey did not gather information on violence/coercion during anal sex. Future studies need to address these gaps. In addition, qualitative studies are needed to better understand the context in which anal intercourse occurs. In spite of these limitations, this is one of the first studies to document for the clients of FSWs the practice of anal intercourse and the correlates of condom use during anal intercourse.

Conclusions

The study indicates that HIV prevention programs targeting FSWs and their clients must highlight the increased risk unprotected anal intercourse poses for both self and partners. Condoms and water-based lubricants need to be marketed to reduce these risks. Interventions also need to address factors that influence condom negotiation ability of sex workers. Given the multidirectional risk, condom promotion programs must be extended to include specific information on the benefits of consistent condom use while engaging in anal and other types of sex. Safer sex messages addressing heterosexual anal intercourse need to be incorporated into HIV prevention interventions for both FSWs and their clients. Current prevention programs fail to address this issue. Greater emphasis in AIDS/STI prevention must be given to this typically stigmatized and underreported sexual practice.

Contributors

SR and KN contributed to concept development, data analysis and interpretation, and writing and finalization of the manuscript. LR, PG, DY, SS, BG, HR, TS, and RSP contributed to concept design, review and finalization of the manuscript.

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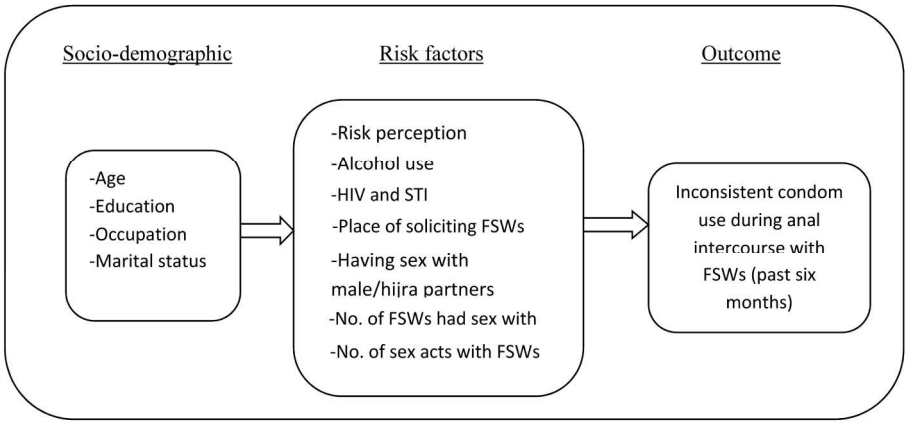
Table 1: Characteristics of clients of FSWs who reported anal intercourse (past six months) with occasional and regular FSWs and condom use

Characteristics	Consistent condom users (n=397, 51.5%) % (number)	Inconsistent condom users (n=280, 48.4%) % (number)	p-value
Age			
≤25 years	27.1 (117)	15.6 (53)	0.165
26 years or older	72.8 (280)	84.3 (227)	
Education			
Illiterate	14.8 (64)	49.9 (57)	0.003
Literate	85.2 (333)	50.0 (223)	
Marital status			
Never married/widowed/separated/divorced	29.8 (120)	20.11 (84)	0.266
Currently married	70.1 (277)	79.8 (196)	
Occupation			
Non-laborer (students/business/service)	51.4 (214)	46.1 (90)	0.749
Manual laborer (agricultural/non-agricultural labor/cultivator)	48.5 (181)	53.8 (190)	
Place solicited FSWs			
Non-public place (brothel/home/lodge/dhaba)	30.6 (117)	22.9 (93)	0.448
Public place	69.3 (278)	77.1 (186)	
No. of FSWs had sex with in the past one month			
≤3 FSWs	72.3 (324)	86.4 (229)	0.088
≥ 4 FSWs and above	27.6 (73)	13.5 (51)	
No. of sex acts with FSWs in the past one month			
≤ 4 times	73.7 (285)	76.0 (184)	0.812
≥ 5 and above	26.2 (111)	23.9 (95)	
Perceive to be at high risk of exposure to HIV			
No	92.8 (337)	52.0 (188)	0.000
Yes	7.13 (39)	47.9 (82)	
Alcohol user			
Infrequent drinker	62.4 (262)	43.9 (142)	0.031
Frequent drinker (everyday)	37.5 (116)	56.0 (121)	
Ever had anal intercourse with a man/hijra			
No	60.5 (311)	81.2 (179)	0.022
Yes	39.4 (86)	18.7 (101)	
Any HIV/STIs			
Negative	90.2 (367)	67.6 (253)	0.085
Positive	9.7 (30)	32.3 (27)	

Table 2: Independent factors associated with inconsistent condom use during anal intercourse with FSWs in multivariate analysis

Characteristics	Crude odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age				
≤25 years	Referent		Referent	
26 years or older	2.00 (0.74-5.40)	0.170	2.68 (1. 09-6.61)	0.032
Education				
Illiterate	Referent		Referent	
Literate	0.17 (0.05-0.59)	0.005	0.66 (0.28-1.56)	0.347
Occupation				
Non-laborer (student/business/service)	Referent		Referent	
Manual laborer (agricultural/non-agricultural labor/cultivator)	1.23 (0.33-4.48)	0.749	2.43 (1.21-4.90)	0.013
Marital status				
Never married/widowed/separated /divorced	Referent		Referent	
Currently married	1.69 (0.66-4.31)	0.269	0.32 (0.13-0.80)	0.015
Place solicited FSWs				
Non-public place (brothel/home/lodge/dhaba)	Referent		Referent	
Public place	1.49 (0.52-4.20)	0.449	1.26 (0.60-2.61)	0.533
No. of FSWs had sex with in the past one month				
≤3 FSWs	Referent		Referent	
≥ 4 FSWs and above	0.41 (0.14-1.16)	0.094	0.29 (0.10-0.84)	0.022
No. of sex acts with FSWs in the past one month				
≤ 4 times	Referent		Referent	
≥ 5 and above	0.88 (0.32-2.41)	0.812	2.53 (0.09-5.90)	0.031
Perceive to be at high risk of exposure to HIV				
No	Referent		Referent	
Yes	11.99 (3.08-46.5)	0.000	4.82 (1.91-12.14)	0.001
Alcohol user				
Infrequent drinker	Referent		Referent	
Frequent drinker (everyday)	2.11 (1.06-4.20)	0.033	2.63 (1.46-4.71)	0.001
Ever had anal intercourse with a man/hijra				
No	Referent		Referent	
Yes	0.35 (0.14-0.87)	0.025	0.76 (0.39-1.50)	0.440
Any HIV/STIs				
Negative	Referent		Referent	
Positive	4.42 (0.74-26.32)	0.102	0.73 (0.25-2.12)	0.568

Figure 1: Conceptual framework of factors related with inconsistent condom use during anal intercourse



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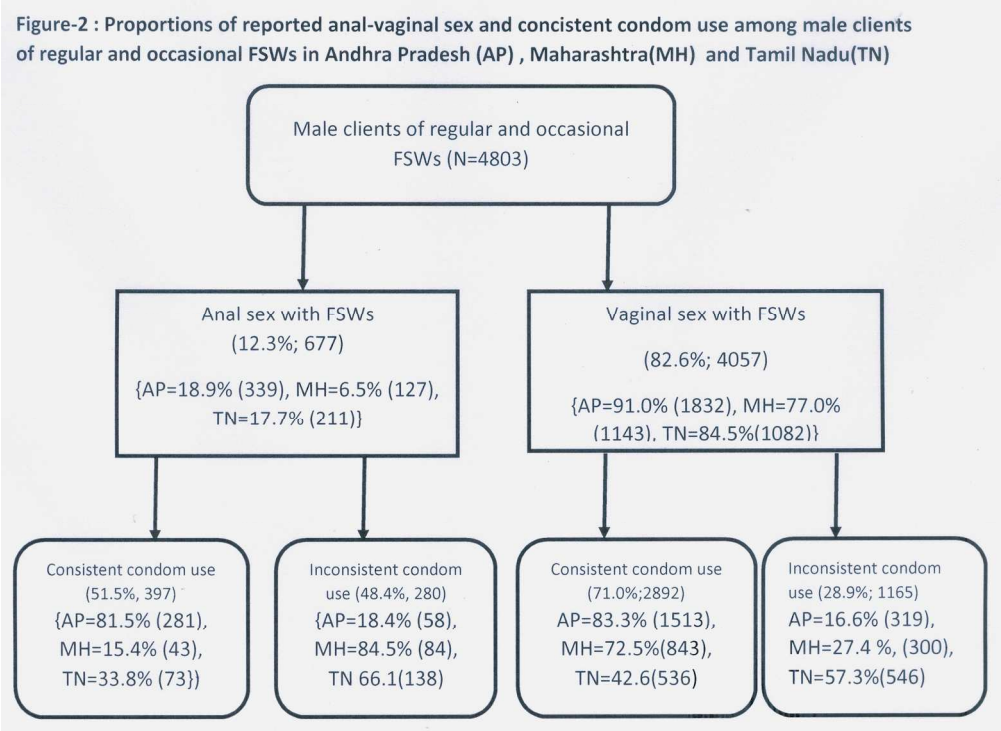

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3-4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	3	State specific objectives, including any pre-specified hypotheses	7,9
Methods			
Study design	4	Present key elements of study design early in the paper	7,8,9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7,8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7,8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	9,10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	9,10
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	-
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10,11
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10,11
		(*b*) Describe any methods used to examine subgroups and interactions	-
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	-
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	11, 12
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	11, 12
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	11, 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11, 12
		(*b*) Report category boundaries when continuous variables were categorized	-
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	12, 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15, 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	15, 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.