PREVALENCE AND RISK FACTORS FOR REPRODUCTIVE TRACT INFECTIONS AMONG WOMEN IN RURAL VIETNAM

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Abstract. The objective of this study was to estimate prevalence and risk factors of reproductive tract infections (RTIs) among women in Haiphong, Vietnam. In October 1998, 197 women aged 18-49 were recruited into a community-based, cross-sectional study. Of the 197 women, 95 (49.5%) were diagnosed with ≥1 endogenous reproductive tract infections (RTI) and 7 (3.6%) with ≥1 sexually transmitted disease (STD). In three separate multivariate analyses, age <30 years (OR = 2.5; 95% CI = 1.1, 5.8), residential mobility (OR = 2.3; 95% CI = 1.1, 4.9), self reported genital itch/discharge (OR = 2.1; 95% CI = 1.1, 4.1), and reported belief that RTI symptoms were shameful (OR = 2.5; 95% CI = 1.2, 5.0) were associated with bacterial vaginosis (BV); low education was associated with candida (OR = 2.6; 95% CI = 1.0, 6.7); ≥1 abortion was associated with ≥1 STD (OR = 9.2; 95% CI = 1.1, 427). The prevalence of STDs was low but the prevalence of endogenous infections was high. Abortion is a proxy for other factors, such as high risk sexual behavior in either the woman or her partner. Given the low prevalence STD in this area of Vietnam, clinical case management of women presenting with RTI symptoms should focus on treatment of the more common endogenous infections, candida and BV.

INTRODUCTION

Reproductive tract infections (RTIs), including sexually transmitted diseases (STDs), endogenous genital tract infections (*eg* bacterial vaginosis and candida), and iatrogenic infections (*eg* IUD insertion) are a global health problem for women (Wasserheit *et al*, 1989). RTIs can result in pelvic inflammatory disease, infertility, adverse pregnancy outcomes, carcinoma and increased susceptibility to HIV (Fleming and Wasserheit, 1999), particularly in settings where diagnosis and treatment are suboptimal.

Data on the prevalence of RTIs in Vietnam are unreliable and scarce. Reported prevalence rates have varied (21-69%) (Anh *et al*, 1996; Phan *et al*, 2002) because of different ascertainment methods. We assessed demographic and behavioral factors associated with laboratory diagnosed RTIs in rural women in Vietnam.

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MATERIALS AND METHODS

In October 1998 we conducted a population-based, cross-sectional survey in a rural village in Hai Phong Province, a port province of 1.7 million people located 100 km north of Hanoi. Hai Phong is experiencing one of the most rapidly increasing localized HIV epidemics in Vietnam (Quan *et al*, 2000). The number of cases (415) detected in the first 6 months of 1998 was 11 times higher than those detected over the previous 5 years combined (Hai Phong AIDS Committee, 1998).

We selected one rural village (An Hung) because it was accessible and demonstrated local commitment. We selected 284 residents using systematic random sampling from a list of

women who participated in a prior behavioral survey (Go *et al*, 2002). Women were invited for a personal interview and clinical pelvic exam, including collection of vaginal and blood specimens.

Questions included current and past experience with RTI symptoms, health-seeking behavior, socio-economic characteristics, STD knowledge, sexual risk behaviors, perceptions of STDs, perceived morbidity and social support. Female residents were aged 18-49 and willing to provide informed consent. The study was approved by the National AIDS Committee of Vietnam, Johns Hopkins Bloomberg School of Public Health and the NIH Office for Protection from Research Risks.

Clinical and laboratory methods

High vaginal swabs taken for Gram staining and evaluation for *Trichomonas vaginalis* and candidiasis were evaluated by light microscopy using wet mounts to identify motile trichomonads and fungal hyphae or budding yeasts. *Neisseria gonorrhoeae* and *Chlamydia trachomatis* were detected using DNA amplification with ligase chain reaction (Abbott LCx Probe System, Abbott Laboratories, Abbott Park, IL, USA). Bacterial vaginosis was diagnosed by Gram stain using the Nugent method (Nugent *et al*, 1991). Serum was tested for syphilis by rapid plasma regain (RPR; Human, Germany) and Treponema pallidum hemagglutination assay (TPHA, Murex Diagnostics, England).

Statistical methods to assess risk factors

Data were double entered and analyzed using SAS software version 6.12 (SAS Institute, 1996). Three multivariate models were developed to evaluate risk factors for BV, candida and STDs. We first calculated cross-tabulations and χ^2 tests of demographic and behavioral factors with each outcome.

Shame associated with RTI symptoms was measured by asking two questions on a Likert scale about shame and personal responsibility. Prior to their clinical exam, respondents were asked about current and recent (past 6 months) abnormal vaginal itching or discharge.

Variables associated with each outcome ($p < 0.10$) were entered into a multivariate logistic regression model to identify independent associations. To adjust for potential confounders, we used forward stepwise logistic regression analysis. STDs entered in this model were chlamydia, gonorrhea, syphilis and trichomonas. We assessed two additional variables representing the husband's occupation and number of nights he was absent overnight during the previous year.

RESULTS

Description of the study population

Of 284 invited participants, 197 (69.7%) came for the clinical exam. Non-participants were slightly younger than participants (mean age 34.3 *versus* 35.6; p-value= 0.04). There were no differences in marital status, education, or occupation.

A description of the study population is shown in Table 1. The mean age was 35.7 years. Most women (88.7%) had completed a secondary education and nearly all (98.0%) were married. The most common contraceptive method was the intrauterine device (IUD) (27.9%) followed by sterilization (15.2%) and condoms (13.7%). About half the women (51.8%) reported abnormal genital itching or vaginal discharge in the past 6 months. Most women reported one lifetime sexual partner, their husband.

Of 192 women, one (0.5%) woman was diagnosed with chlamydia, 3 (1.6%) with gonorrhea, and 3 (1.6%) with trichomonas (Table 1). Endogenous infections were diagnosed in 95 of 197 women; 27.4% were diagnosed with bacterial vaginosis and 25.3% with candida.

Factors associated with infection

Table 2 shows the adjusted odds of factors associated with the three outcomes. Age < 30 years, not a lifetime commune resident, self-reported 6-month genital itch or discharge, and the belief that RTI symptoms were shameful were significantly associated with BV prevalence. Women with IUDs were marginally more likely to have BV than those using other or no contraception.

The only significant risk factor for candida was low education. Having had ≥1 abortion was

Table 1
Description of the study population: women in Hai Phong Province, 1998.

Characteristic	No. (% or range)	95% CI
Age		
Mean	35.7	(SD, 6.6)
Ethnicity		
Kinh ethnicity	196/197	(99.5)
Chinese Vietnamese	1/197	(0.5)
Education (highest level completed)[a]		
Primary school (1st-5th grade)	45/195	(22.8)
Secondary school	128/195	(65.0)
High school or higher	22/195	(11.1)
Primary occupation		
Farmer	163/197	(82.7)
Small trade	17/197	(8.6)
Housework	8/197	(4.1)
Clerical or skilled labor	9/197	(4.6)
Travel to other provinces in past year		
Yes	17/197	(8.6)
No	180/197	(91.4)
Resident in village whole life		
Yes	64/197	(32.5)
No	133/197	(67.5)
Marital status		
Married	193/197	(98.0)
Never married	2/197	(1.0)
Separated or widowed	2/197	(1.0)
Age of first sexual intercourse, median (range)	22 /197	(17-38)
Number of lifetime sexual partners		
1	193/197	(98.0)
2	4/197	(2.0)
Number of pregnancies, median (range)	3/197	(1-19)
Number of lifetime abortion(s)		
0	115/197	(58.4)
1	41/197	(20.8)
2	41/197	(20.8)
Contraceptives being used		
None	82/197	(41.6)
IUD	55/197	(27.9)
Condom	27/197	(13.7)
Sterilization	30/197	(15.2)
Oral contraceptives	3/197	(1.5)
RTIs[b]		
Chlamydia trachomatis	1/192	(0.5) 0.01-2.9
Neisseria gonorrhoeae	3/192	(1.6) 0.3-4.5
Syphilis	2/195	(1.0) 0.1, 3.7
Trichomonas vaginalis	3/192	(1.6) 0.3, 4.5
Bacterial vaginosis	54/197	(27.4) 21.3, 34.2
Candida	49/194	(25.3) 19.3, 32.0
≥ 1 STD	7/192	(3.6) 1.5, 7.4
≥ 1 endogenous infection	95/192	(49.5) 42.2, 56.8

[a]2 participants declined to answer this question.
[b]Denominators vary because of differing sample adequacy for the various assays.

Table 2
Three multivariate models to assess risk factors associated with bacterial vaginosis, candida, and STDs.

Risk factors	Diagnosed w/ disease and characteristic/total women w/ characteristic	Odds ratio (95% CI)
Endogenous infections		
BV (n = 197)[a]		
Resident in commune whole life		
Yes	12/64 (18.8%)	1
No	42/133 (31.6%)	2.3 (1.1, 4.9)
Shame associated with RTI symptoms		
No	31/133 (23.3%)	1
Yes	23/64 (35.9%)	2.45 (1.2, 5.0)
Itching or discharge in past 6 months		
No	26/110 (23.6%)	1
Yes	28/87 (32.2%)	2.08 (1.1, 4.1)
Age		
≥30	41/164 (25.0%)	1
18- 29	13/33 (39.4%)	2.52 (1.1, 5.8)
Candida (n = 194)[b]		
Education		
Primary school	6/37 (16.2%)	1
Higher than primary school	37/106 (34.9%)	2.61 (1.0, 6.7)
STDs (n = 192)[c]		
Abortion (lifetime)		
No	1/113 (0.9%)	1
Yes	6/79 (7.6%)	9.21 (1.1, 427.0)

[a]Adjusted for occupation and all variables statistically significantly associated in logistic regression model.
[b]Adjusted for occupation.
[c]Not adjusted for occupation since all women without STDs were farmers.

significantly associated with having ≥1 STD; no other factors were significantly associated with STD prevalence.

DISCUSSION

We found a low STD prevalence among reproductive aged women in a rural village in northern Vietnam. Our estimates for BV are higher than those reported by two other studies in Vietnamese antenatal clinics (Anh *et al*, 1996; Phan *et al*, 2002) and may be related to the diagnostic criteria (presence of clue cells) used by Anh *et al* (1996) and Phan *et al* (2002) compared to Nugent's method,which we used (Nugent *et al*, 1991).

In our population, douching was not associated with BV. In contrast to others (Calzolari *et al*, 2000; Morris *et al*, 2001), younger women (< 30) here were more likely to have BV. In addition, women who considered RTI symptoms as "shameful" were more likely to have BV. We believe some women may confuse RTI symptoms with STDs and therefore may feel ashamed to seek treatment for RTI symptoms (Go *et al*, 2002).

BV was associated with migration to the village, even when controlling for demographic and behavioral variables. This association may be mediated by a third variable not measured in this survey. Abortion and low education were two independent predictors for STDs and candida and are probably proxies for other unmeasured factors. Abortion may reflect high risk sexual behavior of the woman or partner.

This study has several limitations. Since the sampling frame was cross-sectional, we could

not estimate STD and RTI temporally with respect to risks. The study may have been subject to selection bias, specifically towards selecting symptomatic women. However, when we compared participants with non-participants regarding recent abnormal vaginal discharge using data collected from a survey conducted two months earlier, we found no difference and conclude this bias was not significant.

Interventions that target younger women and raise the awareness of RTI symptoms and their consequences are needed to encourage women to seek treatment from care providers. Given the low STD prevalence rate in this area of Vietnam, clinical case management of women presenting with RTI symptoms should focus on treatment of common endogenous infections, candida and BV. To reduce the stigma associated with RTI symptoms, health education messages targeting non-sexually transmitted infections should be disseminated. At the same time, efforts should be made to provide primary health care providers with information on diagnosing and treating women with non-sexually transmitted RTIs to ensure that women receive appropriate and satisfactory care.

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