Heterosexual relationships and condom-use in the spread of sexually transmitted diseases to women

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Abstract

Objectives—To examine the effect of patient-defined non-regular heterosexual relationships on the incidence of sexually transmitted diseases and other genital infections in women and the role of condom use in the prevention of their spread.

Design—A cross-sectional study of sexual behaviour reported by a standardised self-administered questionnaire in new patients who presented for screening and diagnosis.

Setting—A genitourinary medicine clinic in West London.

Subjects—938 consecutive newly attending women who completed a sexual behaviour questionnaire in 1992.

Main outcome measures—Variables relating to socio-demographic status, sexual behaviour, condom use, sexually transmitted diseases and other genital infections stratified by the reporting of non-regular partners.

Results—We found that women who reported non-regular sexual partners were more likely to be single (p = 0·0001), white (p < 0·0001), have had coitarche before 17 years of age (p = 0·003) and many more sexual partners both in the last year and in their life-time (p < 0·0001) and were more likely to practise fellatio (p < 0·0001), anal penetration (p = 0·004) and to be smokers (p < 0·0001). Paradoxically, the incidence of sexually transmitted diseases and other genital infections was no higher in this group than in the group of women who did not have non-regular partners. Increasing condom use with regular partners correlated with decreasing incidence of gonorrhoea (p < 0·001), chlamydial infection (p < 0·01) and trichomoniasis (p < 0·02), but increasing condom use with non-regular partners did not show this trend.

Conclusions—Regular heterosexual partners play the major role in transmission of bacterial sexually transmitted diseases to women. This is significantly influenced by use of condoms.

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Introduction

Partner change is a major determinant in the spread or reproductive rate (Ro) of sexually transmitted diseases (STDs).[1] Multiple or casual partners increase the probability of exposure to an infected partner.[2] Indeed, Joffe et al found five or more sexual partners to be the only significant independent association with self-reported STD in a study of college students, which included data on partner choice and condom use.[3] In a previous report,[4] we found multiple partners to carry significant relative risks (RR) for gonorrhoea (RR = 2·2), chlamydial infection (RR = 2·2) and ano-genital herpes (RR = 2·6). In addition, more than one partner in the past year carried a risk for any genital infection (RR = 1·7). This study in 1982 pre-dated the Human Immunodeficiency Virus (HIV) generated condom promotion campaigns.

We now report from the same clinical setting characteristics and relative effects of having non-regular sexual partners and using condoms on the incidence of different STD and other genital infections.

Methods

A standardised self-administered questionnaire was given to all newly attending female patients.[5 6] Since our first study in 1982, questions have been added on self-assessed condom use with regular and non-regular partners, frequency of sexual intercourse and cigarette smoking. The question on condom use with non-regular partners was to be answered only if applicable.[7] A response to this question therefore defined those who reported one or more non-regular partners. Infants and children were excluded from the study as were women whose comprehension of English precluded a reliable response.

All patients included in the study were screened for sexually transmitted diseases and genital infections using standard diagnostic criteria with confirmation by culture on modified New York City medium for gonorrhoea, Feinberg Whittington medium for trichomoniasis and Sabouraud's medium for candidosis. Cell culture was used for chlamydial infection and herpetic infection. Genital warts and pelvic inflammatory disease were diagnosed clinically and contact with non-gonococcal urethritis (NGU contact) was diagnosed epidemiologically. Diagnosis of

bacterial vaginosis required the presence of symptoms, vaginal pH below 5 and the finding of clue cells on microscopy.

Data were analysed using SPSS-X software with a Sun4/670 computer. The chi square test with Yates' correction was used to assess significance related to non-regular partners and the chi square test for trend was used to examine the significance of increasing fre-

quency of condom use on the incidence of genital infections.

Results

The questionnaire was issued to all consecutive newly attending women between the 10 February and the 10 August 1992 apart from 38 who were ineligible as previously defined. Of the 1084 women entered into the study, 16 (1·5%) refused to complete the questionnaire, 18 (1·7%) were lesbian and 4 (0·4%) provided incomplete answers. One hundred and eight (10·0%) fully completed questionnaires were also excluded from the analysis because the women had attended for HIV testing only and declined further examination for STD.

The mean age of the 938 women was 27·1 years, median and modal ages 25, range 14–66. Eight hundred and seventy one (92·9%) were under 40 years of age. Ethnic origin was known on 932 women of whom 730 (78·3%) were white, 153 (16·4%) were black, 20 (2·1%) were Asian and 9 (1·0%) were oriental. Marital status was known on 920 women, of whom 741 (80·5%) were single, 122 (13·3%) were married, 56 (6·1%) were separated or divorced and 1 (0·1%) was widowed.

Sexual behaviour and non-regular sexual partners

The question on use of condoms with non-regular sexual partners was completed by 416 (44·3%) of the 938 women, of whom only two (0·2%) did not complete the preceding question on condom use with regular partners. Results are shown in table 1. There was a highly significant difference between those who did and those who did not have non-regular partners over a wide range of demographic, personal and behavioural variables, including ethnicity, marital status, coitarche, recent and life-time partners, anal penetration, oral intercourse, condom use with regular partners and smoking.

The ages of the two groups, the proportions practising anal ejaculation and of those who always used condoms with their regular partners did not differ significantly. Infrequent intercourse ($< \times 1$ per week) was significantly more common in those who had non-regular partners (p = 0·02), but there was no difference in respect of frequent intercourse (more than $\times 3$ per week).

Sexually transmitted and other genital infections

Despite the apparently increased risk of acquiring STD because of a much greater number of sexual partners among those with non-regular partners (p < 0·0001), the two groups showed little difference in the incidence of STD and other genital infections (table 2). This was a completely unexpected finding. A past history of genital infections was like-wise not significantly different between the two groups (table 3), with the sole exception of chlamydial infection, which was reported more frequently by those who had non-regular partners (p = 0·001).

Table 1   Non-regular sexual partners and sexual behaviour in 1992

Variables	Non-regular partners (n = 416)	No non-regular partners (n = 522)	Chi square p
Age:			
< 20 years	38 (9·1%)	56 (10·7%)	0·5
< 25 years	189 (45·4%)	217 (41·6%)	0·3
Ethnicity:			
white	351 (84·6%)	284 (73·7%)	< 0·0001
black	52 (12·6%)	101 (19·4%)	0·006
Single	355 (86·4%)	386 (75·8%)	0·0001
Pregnancy: full-term	77 (15·2%)	133 (26·2%)	0·02
never	244 (61·8%)	282 (55·5%)	0·07
Coitarche:			
< 16	88 (21·2%)	80 (15·3%)	0·03
< 17	178 (42·8%)	172 (33·0%)	0·003
Partners in last year			
> 1	319 (76·7%)	144 (27·6%)	< 0·0001
> 2	175 (42·1%)	31 (6·0%)	< 0·0001
> 5	27 (6·5%)	1 (0·2%)	< 0·0001
Partners in lifetime:			
> 1	413 (99·3%)	446 (85·4%)	< 0·0001
> 5	287 (69·0%)	191 (36·6%)	< 0·0001
> 10	137 (33·1%)	74 (14·2%)	< 0·0001
Anal intercourse:			
penetration	104 (25·0%)	89 (17·1%)	0·004
ejaculation	55 (13·2%)	51 (9·8%)	0·12
Oral intercourse:			
penetration	368 (88·4%)	400 (76·7%)	< 0·0001
ejaculation	241 (58·0%)	241 (46·1%)	0·0004
Condoms with regular partners:			
never	145 (34·9%)	231 (44·4%)	0·004
always	50 (12·0%)	56 (10·8%)	0·6
Vaginal intercourse:			
< × 1/week	124 (29·8%)	120 (23·0%)	0·02
> × 3/week	111 (26·7%)	139 (26·6%)	1·00
Smoking:			
nil	176 (42·3%)	296 (56·7%)	< 0·0001
> 10/day	120 (28·8%)	112 (21·5%)	0·01

Table 2   Non-regular sexual partners and genital infections in 1992

Genital infections	Non-regular partners (n = 416)	No non-regular partners (n = 522)	Chi square p
Gonorrhoea	11 (2·6%)	12 (2·3%)	0·9
Chlamydial infection	21 (5·0%)	32 (6·1%)	0·6
NGU contact	54 (13·0%)	66 (12·6%)	1·0
Trichomoniasis	12 (2·9%)	15 (2·9%)	1·0
Vaginal candidosis	137 (32·9%)	172 (33·0%)	1·0
Bacterial vaginosis	35 (8·4%)	55 (10·5%)	0·3
Genital herpes	23 (5·6%)	42 (8·0%)	0·2
Genital warts	44 (10·6%)	49 (9·4%)	0·6
Pelvic inflammatory disease	6 (1·4%)	12 (2·3%)	0·5
No abnormality detected	130 (31·3%)	140 (26·8%)	0·2

Table 3   Non-regular sexual partners and past history of genital infections

Genital infections	Non-regular partners (n = 407)	No non-regular partners (n = 514)	Chi square P
Gonorrhoea	12 (2·9%)	13 (2·5%)	0·9
Chlamydial infection	26 (6·4%)	10 (1·9%)	0·001
NGU contact	4 (1·0%)	7 (1·4%)	0·8
Trichomoniasis	4 (1·0%)	13 (2·5%)	0·1
Vaginal candidosis	67 (16·5%)	95 (18·5%)	0·5
Bacterial vaginosis	9 (2·2%)	5 (1·0%)	0·2
Genital herpes	11 (2·7%)	23 (4·5%)	0·2
Genital warts	27 (6·6%)	31 (6·0%)	0·8
Pelvic inflammatory disease	9 (2·2%)	11 (2·1%)	1·0
No past history	267 (65·6%)	339 (66·0%)	0·9

Table 4   Condom use with regular partners and genital infections in women—1992

| | Never
n = 376 | Occas
n = 305 | Often
n = 149 | Always
n = 106 | Chi-square for trend | |
					χ^2	p
Gonorrhoea n = 25	13 (3·5%)	9 (3·0%)	1 (0·7%)	0 (0%)	16·40	< 0·001
Chlamydial infection n = 52	26 (6·9%)	17 (5·6%)	8 (5·4%)	1 (0·9%)	6·97	< 0·01
NGU contact n = 119	37 (9·8%)	51 (16·7%)	25 (16·8%)	6 (5·7%)	0·04	> 0·9
Trichomoniasis n = 32	14 (3·7%)	10 (3·3%)	2 (1·3%)	1 (0·9%)	5·48	< 0·02
Candidosis n = 306	126 (33·5%)	93 (30·5%)	52 (34·9%)	35 (33·0%)	0·004	< 0·95
Genital herpes n = 66	30 (8·0%)	24 (7·9%)	7 (4·7%)	5 (4·7%)	2·72	< 0·1
Genital warts n = 93	36 (9·6%)	34 (11·1%)	12 (8·1%)	11 (10·3%)	0·004	< 0·95
Bacterial vaginosis n = 90	43 (11·4%)	28 (9·2%)	10 (6·7%)	8 (7·5%)	3·20	< 0·1
Pelvic inflammatory disease n = 18	11 (2·9%)	4 (1·3%)	2 (1·3%)	1 (0·9%)	3·03	< 0·1
No abnormality detected n = 268	104 (27·7%)	82 (26·9%)	45 (30·2%)	38 (35·8%)	1·82	< 0·2

Table 5   Condom use with non-regular partners and genital infections in women—1992

| | Never
n = 83 | Occas
n = 75 | Often
n = 77 | Always
n = 181 | Chi-square for trend | |
					χ^2	p
Gonorrhoea n = 11	3 (3·6%)	3 (4·0%)	4 (5·2%)	1 (0·6%)	3·72	< 0·1
Chlamydial infection n = 21	6 (7·2%)	4 (5·3%)	4 (5·2%)	7 (3·9%)	1·14	< 0·3
NGU contact n = 54	8 (9·6%)	11 (14·7%)	16 (20·8%)	19 (10·5%)	0·0009	< 0·98
Trichomoniasis n = 12	3 (3·6%)	2 (2·7%)	4 (5·2%)	3 (1·7%)	0·67	< 0·8
Candidosis n = 137	26 (31·3%)	21 (28·0%)	24 (31·2%)	66 (36·5%)	1·28	< 0·3
Genital herpes n = 23	4 (4·8%)	5 (6·7%)	7 (9·1%)	7 (3·9%)	0·27	< 0·7
Genital warts n = 44	3 (3·6%)	6 (8·0%)	10 (13·0%)	25 (13·8%)	9·86	< 0·01
Bacterial vaginosis n = 35	10 (12·0%)	6 (8·0%)	6 (7·8%)	13 (7·2%)	1·25	< 0·3
Pelvic inflammatory disease n = 6	1 (1·2%)	2 (2·7%)	1 (1·3%)	2 (1·1%)	0·15	< 0·7
No abnormality detected n = 130	30 (36·1%)	23 (30·7%)	20 (26·0%)	57 (31·5%)	0·40	< 0·7

Condom-use with regular and non-regular partners

Overall, condom use with non-regular partners was much more frequent than condom use with regular partners. Only 83/406 women (20%) never used condoms with non-regular partners and 181 (43·5%) always used them. By comparison, only 106 of 936 women (11·3%) always used condoms with their regular partners and 376 (40·2%) never did.

The relationships between condom-use and genital infections with both regular and non-regular partners are shown in table 4 and table 5 respectively. Increasing use of condoms with regular partners correlated significantly with declining prevalence of gonorrhoea (p < 0·001), chlamydial infection (p < 0·01) and trichomoniasis (p < 0·02). However, apart from genital warts, the prevalence of infection appeared unrelated to condom-use with non-regular partners.

Discussion

An infinite variety of heterosexual relationships extends from mutual monogamy to frequent brief episodes with multiple partners. Attempts to define these relationships are fraught with problems of subjectivity, reporting accuracy, arbitrary definitions and comparability with other studies. We hypothesised that non-regular relationships would be more hazardous than regular relationships and designed our questionnaire to let our subjects self-assess this aspect of their sexual lifestyles. Only 0·2% did not report a regular sexual partner, but 42% considered that they had at least one non-regular relationship.

Women who reported non-regular partners were much more likely to lead a more diverse and active sex life in terms of earlier coitarche, many more partners, oral intercourse and anal penetration, in addition to which they were much more likely to be smokers and to smoke heavily. This difference was unrelated to youth or to a history of pregnancy. Consistent condom use with regular partners did not differ between the two groups and, most surprisingly, neither did the incidence of STD and other genital infections. Only a past history of chlamydial infection correlated with non-regular partners.

These findings question the impact of non-regular partners on the spread of STD and receive further support from our trend

analysis relating frequency of condom use to morbidity from genital infections. Whereas increasing condom use with non-regular partners did not reduce morbidity, a similar analysis of condom use with regular partners demonstrated a clear benefit in reducing the incidence of gonorrhoea, chlamydial infection and trichomoniasis. Our findings demonstrate that in the current pattern of condom use non-regular partners play a minor role in the transmission of STD and in the incidence of other genital infections. We suggest that the more frequent use of condoms by non-regular partners of women with genital warts is the result of their unpleasant appearance rather than a cause of their presence.

Reported attendance at STD clinics by the British National Survey of Sexual Attitudes and Lifestyles increased with numbers of sexual partners[8] and the incidence of reported STD among college women showed a similar pattern.[3] Our findings appear to conflict with these studies. However, over 40% of STD clinic attenders do not have an STD even by the broadest definition[9] and attendance may be triggered as much by change of partner as by morbidity. The response rate in the study of college women was only 47·7% and thus susceptible to considerable bias. Furthermore, only one partner is required to transmit an STD and partner behaviour is thus of equal importance. Finally, our study examines only one current episode in the life of our female subjects.

We therefore propose three explanations for our findings. Firstly, the use of condoms was greatest and therefore most effective with non-regular partners (only 20% of women never used condoms with non-regular partners). Secondly, women are much more frequently exposed to possible infection from their regular partners than from their non-regular partners. Thirdly, regular partners are rarely permanent partners and multiply with time (table 1).

While our study has shown that regular partners present the principal risk for transmission of STDs to women and our findings emphasise the importance of condom use in STD control, they also show that this benefit does not extend to the viral STDs or to infections associated with organisms more widespread in nature.

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