How often are gonorrhoea and genital yeast infection sexually transmitted?

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SUMMARY Although gonorrhoea is often regarded as the sexually transmitted disease against which others are measured, its infectivity is not clearly understood. Estimates of the infection rate have varied from 5-90%. In this study, 50 couples with gonorrhoea were matched with 50 couples with genital yeast infection. Gonorrhoea was diagnosed in both partners of 32 couples and genital yeast infection in both partners of 21 couples. These figures provide an indication of the sexual transmission of these conditions. The higher figure for gonorrhoea may be related to a greater urgency in tracing contacts.

Introduction

Gonorrhoea is often regarded as the sexually transmitted disease against which others are measured. Yet its infectivity is not clearly known. For example, the infection rate among female contacts of men with gonorrhoea was 91% as assessed by Thin *et al.* (1971), but at the same hospital Barlow *et al.* (1976) indicated that it was only 66%. Furthermore, Lee *et al.* (1972) suggested that infectivity of gonorrhoea was very much lower, between 5 and 40% with a mean of about 27%.

In view of the variation in these figures and the lack of precision in their meaning, we decided to conduct a case control study to compare the prevalence of infection among contacts of patients with gonorrhoea and the contacts of patients with genital yeast infection.

Patients and methods

All patients with gonorrhoea were urged to bring their sexual contacts to the clinic for examination. Eighty-two consecutive pairs of male and female partners attending this department within 28 days of each other were included in the study.

All female patients with a documented recurrence of vaginal yeast infection, or with a history of more than two episodes during the preceding six months, were urged to bring their regular partner(s) to the

clinic. All men with penile yeast infection were also urged to bring their regular partner(s). Eighty-three consecutive pairs of male and female partners attending within 35 days of each other were included in the study.

DIAGNOSTIC TECHNIQUES

The methods used to diagnose gonorrhoea in men and women have already been described (Alani *et al.*, 1977; Thin and Shaw, 1979). The methods used to diagnose genital yeast infection in women were as described by Thin *et al.* (1975), but only positive Gram-stain and culture results will be considered here. In men with a suspected penile yeast infection and in all male contacts, a swab was either taken from any sub-preputial exudate or rolled around the coronal sulcus in the absence of exudate elsewhere; this swab was used to prepare a smear for Gram staining and a Sabouraud culture was inoculated. Typical Gram-stain appearances or cultural findings or both were regarded as positive results (Thin *et al.*, 1975).

Statistical comparisons were made using a χ^2 test with Yates's correction, or Fisher's Exact Test for contingency tables, or McNemar's test for differences between affected partners.

Results

DEMOGRAPHIC DATA

Fifty couples with gonorrhoea were matched with 50 couples with genital yeast infection for age, race, and marital state. In the group with yeast infection, the women's ages ranged from 16 to 35 years with a

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mode of 26 and a mean of 24.2 years, and the men's ages ranged from 17 to 54 years with a mode of 29 and mean of 27.4 years. In the group with gonorrhoea the women's ages ranged from 16 to 38 years with a mode of 23 and a mean of 24.7 years, and the men's ages ranged from 16 to 52 years with a mode of 28 and a mean of 27.0 years. In each disease group 46 couples were white, two were Negro, and two couples were Asian; both partners of all couples were of the same racial origin. In the group with gonorrhoea, three men had two partners but only one of them, and both his partners, were in the matched group. Each patient with yeast infection had only one partner.

OVERALL RESULTS

The overall results of matched and unmatched couples with gonorrhoea and genital yeasts are shown in Table 1. Of the patients with gonorrhoea, 62.2% of both partners were affected but only 41% of both partners had genital yeasts. If the findings in the matched pairs are examined alone a significant difference is noted ($\chi^2 = 14.25$; $P < 0.001$) (Table 2). This difference is examined further in Table 3, which shows that in couples with gonorrhoea significantly more are both infected than in couples with genital yeast infection.

TIME-INTERVAL BETWEEN EXAMINATIONS

More men than women had gonorrhoea and more women than men had genital yeasts (Table 1). The figures in Tables 4 and 5 support this finding.

The difference in the infection rates might be due to the difference in the interval between examination of the individual members of each pair. Among matched pairs with gonorrhoea, 86% were examined within 14 days of each other and in 60% both had positive results (Table 6). Similar findings were obtained when those examined within seven days of each other were compared with the remainder.

In contrast, only 74% of matched pairs with genital yeast infection were seen within 14 days of each other and both partners had positive results in only 28% (Table 7).

Table 2 Comparison of results for infected men and women (50 matched couples)

Infection	With positive results		
	Men and women	Men only	Women only
Yeast infection	21	6	23
Gonorrhoea	32	12	6

The proportion of infected men and women are significantly different in the two disease groups.

$$\chi^2_2 = 14.25 \text{ } P < 0.001$$

Table 3 Comparison of results for matched couples in which both partners were affected

Infection	With positive results	
	Men and women	Men or women
Yeast infection	21	29
Gonorrhoea	32	18

In gonorrhoea significantly more couples are both infected.

$$\chi^2_1 = 4.01; P < 0.05$$

Table 4 Comparison of results for matched couples with only one infected partner

Infection	With positive results	
	Man	Woman
Yeast infection	6	23
Gonorrhoea	12	6

In gonorrhoea significantly more men are infected while significantly more women have yeasts.

$$\chi^2_1 = 8.08; P < 0.01$$

Table 5 Comparison of results for matched couples

Results for men	Results for women			
	Gonorrhoea*		Yeast infection†	
	+	-	+	-
Positive	32	12	21	6
Negative	6	0	23	0

+ positive - negative

* $\chi^2 = 1.39$ (not significant) by McNemar's test

† $\chi^2 = 8.83$; $P < 0.01$ by McNemar's test

Table 1 Overall results

Results for partner		For gonorrhoea			For yeast infection			
Male	Female	Matched couples	Unmatched couples	Total	Matched couples	Unmatched couples	Total	
				No. %			No. %	
+	+	32	19	51 62.2	21	13	34	41.0
+	-	12	6	18 22.0	6	6	12	14.5
-	+	6	7	13 15.8	23	14	37	44.5

+ positive - negative

Table 6 Interval between examination of both partners for gonorrhoea

Examination at (days)	Positive results for	
	Both partners	Only one partner
0-14	30	13
15-28	2	5

* Fisher's Exact test $P < 0.05$

Table 7 Interval between examination of both partners for yeast infection

Examination at (days)	Positive results for	
	Both partners	Only one partner
0-14	14	23
15-28	7	6

 $\chi^2_1 = 0.46$ not significant

Discussion

Case control comparisons tend to have bias, and the main ones in our study were: (a) all patients with gonorrhoea were urged to bring all partners (although all men with a penile yeast infection were urged to bring regular partners, only women with recurrent yeast infection were urged to bring regular partners); (b) contact-tracing was more vigorous in patients with gonorrhoea; and (c) gonorrhoea spreads via a chain of infection while genital yeast infection can arise in a stable partnership.

In addition, we considered that accurate data could not be collected on the time interval between the infecting sexual intercourse and examination or on the number of exposures between each patient and an infected partner. We believe, however, that our findings do provide some measure of infectivity in an STD clinic population.

Thus, under the conditions influencing the behaviour of clinic patients and the design of the study, gonorrhoea (64%) appears to be transmitted significantly more often than genital yeast infection (42%). The figure for gonorrhoea resembles the figure of 66% for infected female contacts quoted by

Barlow *et al.* (1976) and is notably higher than the estimate given by Lee *et al.* (1972). The figure for genital yeasts closely resembles the estimate of 39% reported by Thin *et al.* (1977). Gonorrhoea infects men more often than women but genital yeasts infect women more often than men. The latter findings may be related to autoinfection or reinfection from the bowel (Rohatiner, 1966).

The greater urgency of contact-tracing in gonorrhoea brings sexual contacts to the clinic early and there is a high proportion of positive results (Table 6). The lesser urgency in genital yeast infection brings a slower response from contacts with a lower proportion of positive findings, although differences were not significant (Table 7).

Our findings support the well-established view that gonorrhoea is an infectious disease and that rapid, accurate contact-tracing is important in its control. Contact-tracing is less important in genital yeast infection. The previously reported association of genital yeast infection with other STDs (Thin *et al.*, 1977), however, supports the need for contact-tracing in patients with this condition.

References

- Alani, M. D., Darougar, S., Burns, D. C. M., Thin, R. N., and Dunn H. (1977). Isolation of *Chlamydia trachomatis* from the male urethra. *British Journal of Venereal Diseases*, **53**, 88-92.
- Barlow, D., Nayyar, K., Phillips, I., and Barrow, J. (1976). Diagnosis of gonorrhoea in women. *British Journal of Venereal Diseases*, **52**, 326-328.
- Lee, T. Y., Utidjian, H. M. D., Singh, B., Carpenter, U., and Cutler, J. C. (1972). Potential impact of chemical prophylaxis on the incidence of gonorrhoea. *British Journal of Venereal Diseases*, **48**, 376-380.
- Rohatiner, J. J. (1966). Relationship of *Candida albicans* in the genital and anorectal tracts. *British Journal of Venereal Diseases*, **42**, 197-200.
- Thin, R. N. T., Williams, I. A., and Nicol, C. S. (1971). Direct and delayed methods of immunofluorescent diagnosis of gonorrhoea in women. *British Journal of Venereal Diseases*, **47**, 27-30.
- Thin, R. N. T., Atia, W., Parker, J. D. J., Nicol, C. S., and Canti G. (1975). Value of Papanicolaou-stained smears in the diagnosis of trichomoniasis, candidiasis, and cervical herpes simplex virus infection in women. *British Journal of Venereal Diseases*, **51**, 116-118.
- Thin, R. N., Leighton, M., and Dixon, M. J. (1977). How often is genital yeast infection sexually transmitted? *British Medical Journal*, **2**, 93-94.
- Thin, R. N., and Shaw, E. J. (1979). Diagnosis of gonorrhoea in women. *British Journal of Venereal Diseases*, **55**, 10-13.