# "Not thrush again!" Women's experience of post-antibiotic vulvovaginitis

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## ABSTRACT

***Objectives:*** To examine the frequency of post-antibiotic vulvovaginitis (PAV); describe how women prevent and treat PAV; and determine whether concern about PAV affects their decisions about taking antibiotics.

***Design:*** Cross-sectional survey using a written questionnaire.

***Setting and participants:*** Five general practice waiting rooms in north-western Melbourne, in February 2000. 1298 women aged 18–70 years were surveyed.

***Main outcome measures:*** Self-reported symptoms and management of vulvovaginitis and PAV.

***Results:*** The response rate was 86%. Thirty-five per cent of women reported ever having PAV and 73% reported ever having symptoms suggestive of vulvovaginal candidiasis. Antifungal medications and lactobacillus products or yoghurt were most popular for both prevention (49%, 40%) and treatment (63%, 43%) of PAV. Other home remedies such as tea tree oil, vinegar, and dietary and clothing modification were infrequently used by the women surveyed. Twenty-three per cent of women who had taken antibiotics in the previous month had experienced symptoms of vulvovaginitis. Of women who had ever had vulvovaginitis, 35% were moderately to very concerned about developing PAV when prescribed antibiotics. Because of this concern, around a fifth of these women would not take prescribed antibiotics.

***Conclusions:*** Concern about PAV affects women's decision-making regarding antibiotic use. Many women use unproven complementary therapies to prevent or treat PAV. When prescribing antibiotics, doctors should discuss the risks of PAV and its management with patients.


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VULVOVAGINAL CANDIDIASIS (VVC) is a common problem, causing significant morbidity and affecting women's wellbeing. It results in major costs to the healthcare system,[1-3] with annual costs in the United States estimated at $US1.8 billion.[4]

Access to over-the-counter (OTC) medications allows women to self-diagnose and treat vaginal symptoms.[5,6] Although this increases women's autonomy, there are concerns about the accuracy of self-diagnosis and the appropriateness of OTC medication choice,[7] as well as fears of cross-resistance of *Candida* spp to imidazoles resulting from inappropriate use.[8]

Studies of the extent of the impact of symptoms of VVC on women and how they manage them are limited by this difficulty of accurate self-diagnosis.[7] Given this limitation, studies in the United States have shown that a high proportion of women use OTC antifungal agents or alternative treatments for chronic vaginal symptoms,[9,10] and that more than half of a group of white women consulted a doctor for their most recent episode of vulvovaginitis.[11] A study in the United Kingdom found that a third of women had bought OTC antifungal medications for vulvovaginitis,[2] and that women often used alternative treatments in addition to OTC antifungal agents.[3]

Cohort and case–control studies have found a significant association between taking antibiotics and developing VVC.[12-14] A comprehensive literature search found only one US prospective community-based study in which 28% of 78 women developed symptomatic microbiologically proven candidal post-antibiotic vulvovaginitis (PAV).[15]

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Australian community data are lacking. We found no published research of how women specifically manage the problem of PAV. We report here a cross-sectional study exploring how often symptoms of PAV occur, how women manage these symptoms, and whether concern about PAV affects their decisions regarding antibiotic use.

## METHODS

### General practices

An alphabetical list of general practices was obtained from a large Melbourne Division of General Practice. Practices to approach were chosen by a computer-generated list of random numbers.

Reception staff at the participating general practices received an hour of training in preparation for the study and almost daily visits from an experienced research assistant.[16] Over a period of 2 weeks in February 2000, reception staff were asked to give a questionnaire to each eligible patient to complete while in the waiting room.

### Survey

The questionnaire was compiled from literature on VVC and PAV,[12,17] and pilot-tested with a convenience sample of women. In the questionnaire, VVC ("thrush") was defined as vaginal itch, irritation and/or discharge, and PAV as these symptoms occurring within one month of taking antibiotics. Fifteen items were arranged in four sections: lifetime experience of VVC; experience

of and risk factors for PAV/VVC in the previous month; self-management of PAV; and demographic information.

### Study sample

Women aged between 18 and 70 years were eligible for the study. Exclusion criteria were factors that would prevent women from completing the survey — major illness, visual or motor impairment, or inability to speak English.

### Ethical approval

The Human Research Ethics Committee of the University of Melbourne approved the study.

### Statistical analysis

Assuming that 20% of women patients in general practice will have been prescribed antibiotics in the previous month, then 1390 women would be required from five general practices to yield an estimate of 25% of PAV with a margin of error of 6%, assuming an intraclass correlation of 0.01.

The age distribution of the study sample was compared with that of the population of the North West Melbourne Division of General Practice, and 95% CIs for the study sample were adjusted for clustering effect. (This takes into account the fact that women who choose to attend a particular clinic may have similar characteristics that differentiate them from other groups of women.) Age was summarised as mean (SD). All other variables were summarised as frequencies and percentages. Prevalence estimates and percentages are presented with 95% CIs adjusted for clustering effect. Associations between categorical variables were examined using Pearson's $\chi^2$ statistic, with adjustment for clustering effect using the Rao and Scott second-order correction.[18] Analysis was performed using Stata 7.0.[19]

**1: Comparison of age distribution of the population of North West Melbourne Division of General Practice[20] and that of the sample**

| Age group | Population of NW Melbourne | Study sample* | 95% CI† |
|---|---|---|---|
| 20–24 | 9 972 (12.4%) | 93 (8.9%) | 6.7%–11.1% |
| 25–29 | 11 056 (13.7%) | 182 (17.5%) | 14.7%–20.3% |
| 30–34 | 10 484 (13.0%) | 151 (14.5%) | 8.8%–20.2% |
| 35–39 | 9 737 (12.1%) | 126 (12.1%) | 4.1%–20.1% |
| 40–44 | 8 691 (10.8%) | 102 (9.8%) | 5.3%–14.2% |
| 45–49 | 8 202 (10.2%) | 124 (11.9%) | 7.6%–16.2% |
| 50–54 | 6 351 (7.9%) | 94 (9.0%) | 4.5%–13.5% |
| 55–59 | 5 785 (7.2%) | 91 (8.7%) | 5.6%–11.8% |
| 60–64 | 5 318 (6.6%) | 43 (4.1%) | 0.2%–8.1% |
| 65–69 | 4 990 (6.2%) | 36 (3.4%) | 1.8%–5.1% |
| Total | 80 586 (100.0%) | 1 042 (100.0%) | |

* Excludes women aged 17–19 years and > 70 years, as population data were not available for these age groups. † 95% CI for the sample percentages adjusted for clustering effect.

**2: Self-reported symptoms of vulvovaginitis**

| | No. of women | No. (%) of women with symptoms | 95% CI† |
|---|---|---|---|
| Symptoms of vulvovaginitis | | | |
| Ever | 1089 | 798 (73.3%) | 66.7%–79.8% |
| In previous month | 1015 | 263 (25.9%) | 19.6%–32.2% |
| In previous 12 months | 1027 | 426 (41.5%) | 32.2%–50.7% |
| Ever after course of antibiotics | 1089 | 379 (34.8%) | 30.8%–38.8% |
| Antibiotic therapy | | | |
| Antibiotics in previous month | 1005 | 121 (12.0%) | 8.2%–15.9% |
| Symptoms during or after antibiotics in previous month | 120* | 28 (23.3%) | 1.0%–45.7% |

* One subject with an inconsistent response was excluded.
† 95% CI for percentages adjusted for clustering effect.

## RESULTS

Of the 16 practices approached, four were ineligible (one solo practitioner was on holidays, one clinic had closed and two had populations unsuitable for the subject of the study — one was for army personnel and the other had elderly, non-English speaking patients). Of the remaining 12 practices, five agreed to participate. The location of these five clinics ranged from inner city to outer suburban Melbourne. Their patients had a mixture of ages from young families and students to elderly people, with SEIFA codes ranging from 3 to 9 (Socio Economic Indexes For Areas: 1 = lowest socioeconomic group and 11 = highest).[21]

### Sample

The response rate was 86% (1117/1298), after 103 women were excluded, mainly due to poor literacy in English. The proportion of eligible subjects missed at each clinic ranged from 0 to 38% (see Pirotta et al for a discussion of waiting-room sampling[16]).

The mean age of participants was 39.5 years (SD, 13 years). The distribution of ages was close to that of the regional population (Box 1), with women under 25 and over 60 years being slightly under-represented. Four per cent of participants had completed primary school only, 49% had completed secondary school and 47% had tertiary qualifications.

As many women did not answer all questions, the denominators given vary.

### Prevalence and incidence of vulvovaginitis

Because VVC cannot be verified without confirmation from microbiological specimens, the results presented refer to vulvovaginitis. Box 2 shows how frequently women experienced these symptoms. In the previous year, 15% of the sample reported vulvovaginitis once, a further 15% twice and 11% more than twice. Over 7% reported four or more episodes in the previous year. Just over 2% of the sample reported symptoms of vulvovaginitis occurring over 10 times a year. Of women who had ever experienced vulvovaginitis, 47% (95% CI, 45%–50%) reported a history of these symptoms after taking antibiotics.

The rate of reported PAV in women who had taken antibiotics in the previous month was 23%; however, poor sampling at one clinic may limit the reliability of this figure. It was not possible to estimate the rate of PAV by antibiotic type because of small numbers in each group.

### Prevention of PAV

The following information pertains to the 798 women who self-reported a past history of vulvovaginitis. These women were asked what strategies they used for

**3: Agents used and health advice sought by women with a self-reported history of vulvovaginitis to prevent and treat post-antibiotic vulvovaginitis (PAV)***

| | Prevention ($n$=751)† | | Treatment ($n$=705)‡ | |
|---|---|---|---|---|
| | No. (%) of women | 95% CI | No. (%) of women | 95% CI§ |
| Agents | | | | |
| Antifungal agents | 367 (49.3%) | (44.5%–54.0%) | 444 (63.2%) | (60.0%–66.3%) |
| Yoghurt/lactobacillus | 298 (39.7%) | (32.0%–47.4%) | 300 (42.6%) | (32.0%–53.2%) |
| Tea tree oil | 5 (0.7%) | (0–1.6%) | 5 (0.7%) | (0–1.7%) |
| Vinegar | 5 (0.7%) | (0–1.4%) | 9 (1.3%) | (0.1%–2.5%) |
| Saltwater baths | 4 (0.5%) | (0–1.4%) | 136 (19.4%) | (14.7%–24.1%) |
| Other agents¶ | 17 (2.3%) | (1.1%–3.5%) | 25 (3.6%) | (1.8%–5.4%) |
| Health advice | | | | |
| Consult doctor | 419/750 (55.9%) | (51.6%–60.1%) | | |
| Consult GP | | | 488/711 (68.6%) | (63.1%–74.2%) |
| Consult gynaecologist | | | 82/693 (11.8%) | (7.4%–16.3%) |
| Consult complementary therapist | 54/748 (7.2%) | (4.1%–10.3%) | 48/701 (6.9%) | (3.2%–10.5%) |

* There are discrepancies in the denominator because of missing data. † Available responses ranged between 738 and 751. ‡ Available responses ranged between 690 and 705. § 95% CI for percentages adjusted for clustering effect. ¶ For a list of other agents, see text. If women listed more than one "other" therapy for the treatment and prevention of possible PAV, they were only included once.

prevention of PAV and which type of health professional they would consult (Box 3). Yoghurt or some type of lactobacillus product was nominated by 40%: 29% took it orally, 7% orally and per vaginum, 3% per vaginum only, with the final 1% not indicating a preferred route.

Fewer than 2% of women used the following methods or products (grouped together as "other agents" in Box 3): clothing, soap or washing-detergent modifications; dietary modifications; Chinese herbs, bicarbonate of soda, vitamins, cortisone, Vasoline, Betadine, vitamin $B_{12}$ and folic acid, Ural, buttermilk, fluconazole, lavender oil, Valerian, cranberry juice, and pau d'arco.

For advice about prevention of PAV, 7% of women (54/748) would consult a complementary therapist, and if a particular therapist was specified, naturopaths (12 women) and herbalists (five women) were the most common.

### *Treatment of PAV (Box 3)*

Yoghurt/lactobacillus was used orally by 29% of women, per vaginum by 3%, and both orally and per vaginum by 9%; the remaining 1% did not specify.

Less commonly used treatments included vinegar, tea tree oil, wearing cotton or light clothing, new or cotton underwear, alteration to diet (eg, reducing yeast, sugar, dairy products and wine), personal hygiene measures (eg, taking baths instead of showers, and changing or avoiding soaps).

For treatment of PAV, 7% of women would consult a complementary therapist, usually a naturopath or herbalist.

### *Correlation between prevention and treatment*

There was a degree of correlation in women's choice of therapy for prevention and treatment of PAV: 319 of the 798 women who had experienced symptoms of vulvovaginitis in the past used antifungal agents for both treatment and prevention of PAV; 258 used lactobacillus/yoghurt; five used tea tree oil and four used saltwater baths.

### *Concern about taking antibiotics*

Box 4 shows women's responses to whether they were concerned about developing PAV and whether that concern would influence their decision to take a course of antibiotics.

## DISCUSSION

The major findings of this study are that vulvovaginitis after taking antibiotics is common, women are concerned about it, and, despite the ready availability of OTC antifungal medications, they often use an unproven complementary therapy (lactobacillus) to prevent or treat PAV.

This is the first study of how women attending general practice manage vulvovaginal symptoms in the context of taking antibiotics. The five randomly chosen general practices provided a good variety of types of practices and socioeconomic areas. A potential weakness of cross-sectional studies is the degree of representativeness of the population from which the sample was drawn. It is unlikely (but possible) that the practice populations of the general practices unable to take part may have differed from those of the participating practices. Similarly, the generalisability of these results to the rest of Australia may be limited. A general practice waiting-room population may be less likely than the broader population to use complementary medicines or consult complementary therapists, and is more likely to have been unwell or to have used medications recently. The data were collected in summer and it is not known whether this influences the prevalence or experience of PAV.

Reliance on self-reported symptoms, with no confirming microbiological data, has limitations.[17] However, the symptoms of vaginal itch and discharge have a high positive predictive value for VVC (91%) in women taking antibiotics.[15] Self-diagnosis of VVC in other settings may be inaccurate, so our study can only claim to report symptoms suggestive of and interpreted by women as VVC. Certainly, a large number of women in our survey reported symptoms of VVC in the previous month. However, as their treatment decisions were based on their perceived symptoms, these findings have clinical relevance for both the women and their practitioners.

Australian women use a wide range of medications to prevent and treat PAV, as did UK women for VVC.[3] Surprisingly, 49% of women with a history of symptoms suggestive of VVC, after taking prescribed antibiotics, would use an

**4: Concern about post-antibiotic vulvovaginitis (PAV) in women with a self-reported history of vulvovaginitis ("thrush"), with and without a history of PAV ($n$ = 798)***

| | Ever had "thrush" | No history of PAV | History of PAV | $P$† |
|---|---|---|---|---|
| Level of concern | | | | |
| Not at all concerned | 312 (41.8%) | 253 (68.2%) | 59 (15.7%) | < 0.001 |
| Slightly concerned | 175 (23.4%) | 64 (17.3%) | 111 (29.5%) | |
| Moderately to very concerned | 260 (34.8%) | 54 (14.6%) | 206 (54.8%) | |
| "I do not take antibiotics because of concern about PAV" | | | | |
| Disagree | 596 (80.7%) | 311 (84.3%) | 285 (77.0%) | 0.004 |
| Agree | 143 (19.4%) | 58 (15.7%) | 85 (23.0%) | |
| Of those who would not take antibiotics ($n$ = 143) | | | | |
| Would tell doctor about not taking antibiotics‡ | 101 (70.6%) | 36 (62.1%) | 65 (76.5%) | 0.07 |
| Would not tell doctor‡ | 31 (21.7%) | 17 (29.3%) | 14 (16.5%) | |
| May or may not tell doctor§ | 11 (7.7%) | 5 (8.6%) | 6 (7.1%) | |

* There are discrepancies in totals because of missing responses. † $P$ value calculated using Pearson's $\chi^2$ statistic, adjusted for clustering effect of practices. ‡ Listed as two yes/no statements. § These 11 women answered yes to both questions.

antifungal agent as prophylaxis. The women in our sample used OTC antifungal agents more commonly than women in a UK study,[2] but less frequently than those in US studies in which the context was chronic vaginal symptoms.[9,10] As in the US studies, about 40% of the women used yoghurt or lactobacillus products to prevent or treat PAV. Women in our sample preferred the oral route; however, at the time of our survey there were no convenient per-vaginum forms of these therapies commercially available. Despite the popularity among women of complementary and alternative products for this indication, there is no evidence that any of these treatments are effective. The limited research in this area has shown promising but inconclusive results for the effectiveness of lactobacillus in treating recurrent VVC.[22-25]

The prevalence of PAV we found (23%) is similar to that found in a previous US study (28%).[15] However, the reliability of this estimate is limited by the variability between practices and the small numbers of surveyed women who had taken antibiotics in the previous month. The self-reported prevalence of symptoms of recurrent VVC in our study (7%), and the reported rate of a history of VVC (72%), are consistent with previously reported rates.[17]

The 19% of women with a history of vulvovaginitis who would not take prescribed antibiotics because of concerns about developing PAV have important implications for practice, as have the 7% of women with a history of vulvovaginitis who would consult a complementary therapist about prevention or treatment of PAV. Because women can now self-medicate with OTC and other remedies, general practitioners may be less aware of women's concerns about PAV. When prescribing antibiotics, they should enquire about a history of PAV and offer advice about its prevention. We are currently undertaking a randomised controlled trial to determine the effectiveness of the commonly used complementary therapy, lactobacillus, for prevention of PAV (<http://www.pav.unimelb.edu.au>).

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## COMPETING INTERESTS

None identified.

## REFERENCES

1. Karasz A, Anderson M. The vaginitis monologues: women's experiences of vaginal complaints in a primary care setting. *Soc Sci Med* 2002; 56: 1013-1021.
2. O'Dowd T, Parker S, Kelly A. Women's experiences of general practitioner management of their vaginal symptoms. *Br J Gen Pract* 1996; 46: 415-418.
3. Chapple A, Hassell K, Nicolson M, Cantrill J. "You don't really feel you can function normally": women's perceptions and personal management of vaginal thrush. *J Reprod Infant Psychol* 2000; 18: 309-319.
4. Foxman B, Barlow R, D'Arcy H. Candida vaginitis: self-reported incidence and associated costs. *Sex Transm Dis* 2000; 27: 230-235.
5. Bessell TL, Hiller JE, Sansom LN. "Pharmacist only" medicines. *Aust N Z J Public Health* 1999; 23: 661-662.
6. Theroux R. Bypassing the middleman: a grounded theory of women's self-care for vaginal symptoms. *Health Care Women Int* 2002; 23: 417-431.
7. Ferris D, Nyirjesy P, Soble J, et al. Over-the-counter antifungal drug misuse associated with patient-diagnosed vulvovaginal candidiasis. *Obstet Gynecol* 2002; 99: 419-425.
8. Cross EW, Park S, Perlin DS. Cross-resistance of clinical isolates of *Candida albicans* and *Candida glabrata* to over-the-counter azoles used in the treatment of vaginitis. *Microb Drug Resist* 2000; 6: 155-161.
9. Nyirjesy P, Weitz M, Grody T, Lorber B. Over-the-counter and alternative medicines in the treatment of chronic vaginal symptoms. *Obstet Gynecol* 1997; 90: 50-53.
10. Lipsky MS, Taylor C. The use of over-the-counter antifungal vaginitis preparations by college students. *Fam Med* 1996; 28: 493-495.
11. Foxman B, Marsh JV, Gillespie B, Sobel JD. Frequency and response to vaginal symptoms among white and African American women: results of a random digit dialing survey. *J Women's Health* 1998; 7: 1167-1174.
12. Hart G. Risk profiles and epidemiologic interrelationships of sexually transmitted diseases. *Sex Transm Dis* 1993; 20: 126-136.
13. MacDonald TM, Beardon PH, McGilchrist MM, et al. The risks of symptomatic vaginal candidiasis after oral antibiotic therapy. *Q J Med* 1993; 86: 419-424.
14. Spinillo A, Capuzzo E, Acciano S, et al. Effect of antibiotic use on the prevalence of symptomatic vulvovaginal candidiasis. *Am J Obstet Gynecol* 1999; 180(1 Pt 1): 14-17.
15. Bluestein D, Rutledge C, Lumsden L. Predicting the occurrence of antibiotic-induced candidal vaginitis (AICV). *Fam Pract Res J* 1991; 11: 319-326.
16. Pirotta M, Gunn J, Harrison D. Accurate sampling in general practice waiting room surveys: methodological issues. *Aust N Z J Public Health* 2002; 26: 152-155.
17. Sobel JD, Faro S, Force RW, et al. Vulvovaginal candidiasis: epidemiologic, diagnostic, and therapeutic considerations. *Am J Obstet Gynecol* 1998; 178: 203-211.
18. Rao JNK, Scott AJ. The analysis of categorical data from complex sample surveys: chi-squared tests for goodness of fit and independence in two-way tables. *J Am Stat Assoc* 1981; 76: 221-230.
19. Stata Corporation. Stata Statistical Software, release 7.0. College Station, Tex: Stata Corporation, 2001.
20. Australian Bureau of Statistics. 1996 Census of population and housing. Canberra: ABS, 1998.
21. HealthWIZ. National social health statistical database. Version 5. Department of Health and Aged Care. Canberra: Prometheus Information, 2000.
22. Williams A, Yu C, Tashima K, et al. Evaluation of two self-care treatments for prevention of vaginal candidiasis in women with HIV. *J Assoc Nurses AIDS Care* 2001; 12: 51-57.
23. Shalev E, Battino S, Weiner E, et al. Ingestion of yoghurt containing *Lactobacillus acidophilus* compared with pasteurized yoghurt as prophylaxis for recurrent candidal vaginitis and bacterial vaginosis. *Arch Fam Med* 1996; 5: 593-596.
24. Hilton E, Rindos P, Isenberg HD. Lactobacillus GG vaginal suppositories and vaginitis. *J Clin Microbiol* 1995; 33: 1433.
25. Hilton E, Isenberg HD, Alperstein P, et al. Ingestion of yoghurt containing *Lactobacillus acidophilus* as prophylaxis for candidal vaginitis. *Ann Intern Med* 1992; 116: 353-357.

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