Women's Use of Over-the-Counter Antifungal Medications for Gynecologic Symptoms

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Background. Over-the-counter (OTC) antifungal products for vulvovaginal candidiasis (VVC) have gained tremendous popularity, as evidenced by staggering increases in sales since the products were switched from prescription-only to OTC status. The rapid escalation in the sale of these products may imply that women are using them inappropriately. The purposes of this study were to determine (1) whether women could correctly diagnose VVC and common genitourinary tract problems after reading classic case scenarios, (2) whether women could correctly select the appropriate treatment for these cases, and (3) whether a previous diagnosis of VVC by a clinician had any effect on a woman's ability to self-diagnose and self-treat VVC.

Methods. Women 16 years of age and older were recruited from medical and community sites to complete a 63-question survey instrument designed to assess their knowledge of the symptoms and signs of pelvic inflammatory disease, bacterial vaginosis, acute cystitis, vaginal trichomoniasis, and vulvovaginal candidiasis after reading classic case scenarios.

Results. A total of 601 women completed the questionnaire, 552 subjects and 49 medically trained women who served as a criterion standard for comparison. Of the 552 subjects, 365 reported a prior diagnosis of VCC and 154 reported no such prior diagnosis. The medically trained cohort was more accurate in diagnosing VVC (83.7% correct) than were subjects who had received a prior diagnosis of VVC (34.5% correct), and more accurate than subjects without a previous diagnosis of VVC (11.0% correct, $P<.001$). A greater percentage of subjects in whom VVC had been previously diagnosed, as compared with the medically trained cohort, would use OTC agents inappropriately for pelvic inflammatory disease (6.7% vs 4.3%, respectively; P=NS), bacterial vaginosis (14.6% vs 6.4%, respectively; $P=.028$), urinary tract infection (2.0% vs 0%, respectively; $P<.001$), and vaginal trichomoniasis (11.8% vs 6.6%, respectively; $P=.048$).

Conclusions. A minority of women were able to correctly diagnose VVC from a classic case scenario. A prior clinical diagnosis of VVC had only a moderate positive effect on subjects' ability to correctly diagnose a classic case. Based on our findings, women likely use OTC antifungals inappropriately to treat gynecologic conditions that are similar but potentially more severe. Numerous adverse consequences may result from misdiagnosis. Improved patient education by health care providers and the manufacturers of OTC antifungal drugs might improve this diagnostic problem.

Key words. Candidiasis, vulvovaginal; diagnosis; self-medication; drugs, nonprescription; antifungal agents.
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The reclassification of former prescription-only pharmaceutical products to nonprescription or over-the-counter (OTC) status appears to be an increasing trend.[1] The shift appeals to the public, pharmaceutical corporations, government, health insurance industry, managed care, and many health care providers. Motivated partially by a self-care movement in the United States, the approach is perceived to reduce medical costs and increase health care convenience for the public. Provided the products are considered safe, efficacious, and specific for common and benign medical conditions, the Food and Drug Administration (FDA) through "more good than harm" judgments has approved certain drugs for OTC availabilty, releasing them from the traditional clinician-controlled

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health care pharmacopoeia. Over-the-counter antifungal pharmaceutical products for the treatment of vulvovaginal candidiasis (VVC) are one example of this trend.

Over-the-counter antifungal products used to treat VVC have gained popularity and acceptance by women for obvious reasons. The popularity is evidenced by the rapid escalation in sales of these products from 13.7 million units per year as prescription-only to 25.3 million units per year as prescription and over-the-counter products. Is this dramatic change explained by the prior relative "nonavailability" of these products or the previous undertreatment of this condition by clinicians? Has there been a sudden epidemic of vulvovaginal candidiasis? Or perhaps are women with diverse lower genital tract problems, commonly grouped collectively by the lay public into the "yeast infection" category, now being seduced by convenience at the checkout counter? That is, are innumerable women now treating themselves inappropriately for what they perceive to be VVC?

With regard to pharmaceutical products, the FDA exists to protect the health of the population by ensuring that drugs are safe and efficacious. This focus has functioned well for the traditional clinician-directed health care system. However, in the context of alternative health care approaches, such as self-care, the definition of "protection" is significantly broader and more complex. The FDA's responsibility to protect now surpasses its earlier role of ensuring drug safety to encompass the intricate domain of appropriate pharmaceutical use. The appropriate use of pharmaceutical products historically has been overseen by the educated and trained medical profession; however, in this new environment, patient education is crucial.

Several critical steps are necessary to ensure the appropriate use of these OTC drugs. The patient must be aware of signs and symptoms of her condition and must have the knowledge and capability to rationally assimilate these signs and symptoms into an appropriate diagnosis. In the case of OTC antifungal vaginal products, this process is considered dependent on the education provided during a previous visit to a health care provider or perhaps by the information provided on an OTC package label. This step is also contingent on the premise that knowledge of symptoms alone will yield an accurate diagnosis. Finally, the patient must select an effective treatment for her condition.

It is unknown whether women consider these necessary processes in self-diagnosing and choosing treatment for vaginal symptoms. The purpose of this study was to determine (1) whether women could correctly diagnose VVC and common genital tract conditions after reading classic case scenarios, (2) whether women could correctly select the appropriate treatment for VVC and other similar conditions, and (3) whether a previous diagnosis of VVC by a clinician had any effect on a woman's ability to self-diagnose.

Methods

Subjects

Women 16 years of age or older were recruited and enrolled at a variety of medical and community sites. The primary sites included the waiting areas of an obstetrician-gynecologist's office, a women's hairdressing salon, and the family practice and obstetrics-gynecology clinics at a medical college. Exclusion criteria were male gender or age less than 16 years.

A cohort of medically trained women employed as faculty physicians, residents-in-training, or nurses of the study institution's departments of family medicine and obstetrics and gynecology and its hospital maternity ward were also recruited to serve as a standard for comparison. Subjects formed three groups for data analysis: subjects without a prior diagnosis of VVC, subjects with a prior diagnosis of VVC, and the medically trained group.

Study Instrument

A questionnaire was designed to determine women's knowledge of the signs and symptoms, diagnoses, and treatment of common genitourinary tract medical problems. The questionnaire included 57 multiple choice and 6 open-ended questions. The questionnaire was pilot-tested by two research assistants and three women from the community. Questionnaire revisions were made based on their suggestions and responses.

Demographic data were obtained by the initial questions. Subjects then were presented with five descriptions of classic cases in the following sequence: pelvic inflammatory disease (PID), bacterial vaginosis, acute cystitis, vaginal trichomoniasis, and VVC. These five scenarios were based on common textbook descriptions of these gynecologic diseases.[2–5] Both negative and positive symptoms were included to accurately depict a "classic" case, and lay terminology was used. The case descriptions were selected to assess discrimination among types of vaginal infection and to determine recognition of more serious medical conditions that may have symptoms analogous to VVC. Each case presentation was followed by the same six main questions that assessed (1) the subject's history of these symptoms; (2) prior evaluation by a clinician for these symptoms; (3) the subject's therapeutic choice for the symptoms from the following options: consult pharmacist, use of OTC vaginal antifungal product, consult physician or nurse, do nothing, or other; (4) the subject's recognition that something was wrong (yes or no); (5) the subject's specific diagnosis for each case description (open-ended question); and (6) whether the problem was considered serious (yes or no). The five case scenarios were followed by 24 additional multiple-choice questions

Table 1. Subjects' Ability to Render Correct Diagnoses for Urogenital Tract Infections

Medical Problem	Subjects with Prior Diagnosis of VVC, % (n=365)	Subjects with No Prior Diagnosis of VVC, % (n=154)	Medically Trained Cohort, % (n=49)	χ^2
Pelvic inflammatory disease	6.0	3.2	69.4	193.29
Bacterial vaginosis	4.4	3.2	75.5	249.55
Urinary tract infection	47.1	33.8	93.9	53.93
Vaginal trichomoniasis	3.6	2.6	65.3	218.68
Vulvovaginal candidiasis	34.5	11.0	83.7	91.66

P<.001 for all differences among the three cohorts.
NOTE: Diagnoses refer to women's assessments of classic presentations of gynecologic problems as described in written case scenarios. VVC denotes vulvovaginal candidiasis.

designed to elicit the subject's history of gynecologic problems and by specific questions designed to assess the subject's knowledge about VVC and its treatment.

Study Design

One of the investigators (C.D.) administered the questionnaires at all sites. The investigator approached all women encountered and asked if they would enroll in a confidential study concerning women's health. Demographic data were recorded for women who refused to participate. When necessary, the investigator assisted illiterate subjects, subjects unable to see well enough to complete the questionnaire, subjects holding small children, or subjects with medical conditions that prevented them from being able to read or write responses. All other subjects individually completed the questionnaire by answering the questions and returning the questionnaire to the investigator.

Statistical Analysis

Specific diagnoses for each case description were determined to be correct if synonymous answers were recorded. For example, bladder infection, urinary tract infection, and urine infection were considered correct answers for the acute cystitis case. Comparisons of questionnaire response categories among the three study groups were performed using cross-tabulation, the chi-square statistic, or Fisher's exact test. The Mantel-Haenszel summary chi-square statistic was used to compare distributions of responses between study and control groups, controlling for previous diagnosis of VVC. Median ages in the study groups were compared using the Wilcoxon's rank sum test. Sensitivity and specificity of subject's diagnosis of VVC from the case scenarios were calculated, along with 95% confidence intervals based on the F-distribution.

Results

A total of 634 women were asked to enroll in the study during the summer of 1995, of which 601 subjects completed the questionnaire and 33 (5.2%) declined to participate. Compared with the study population, women who refused to participate were older (42.1 years vs 34.3 years, $P=.001$), less educated ($P=.01$), and more likely to be of white race ($P=.02$). There was no statistically significant difference in income levels reported between the two groups ($P=.11$). A cohort of 49 medically trained women also completed questionnaires.

The racial distribution of subjects was 43% black, 55% white, and 2% other. More than one half (53%) of the subjects had an annual family income of $20,000 or less. Approximately 88% of subjects were high school graduates and 17% were college graduates. Three hundred eighty-seven (70.1%) subjects reported a history of VVC. The demographics of the medically trained cohort were quite different. The racial distribution was 73% white, 22% black, and 5% other; the mean age was 34.9 years; and 97.7% had an annual family income of more than $20,000. All medically trained women were college graduates.

Subjects' ability to render a correct diagnosis for the case scenarios of urogenital tract infections is reported in Table 1. Compared with the other subjects, a greater percentage of women in the medically trained cohort responded with the correct diagnoses for the five medical problems ($P<.001$). The medically trained cohort also correctly diagnosed the case scenario of VVC three times more often than did the study population.

The effect of a history of a prior clinician diagnosis of VVC on the sensitivity and specificity of diagnosing VVC was examined (Table 2). Thirty-four percent of subjects who had received a prior diagnosis of VVC by a clinician correctly diagnosed the case scenario of VVC, compared with 11.0% of subjects who had never received a diagnosis of VVC ($\chi^2=29.92$, $P<.001$), while 87% of the medically trained cohort who had previously received a diagnosis of VVC by a clinician correctly identified the case ($\chi^2=33.31$, $P<.001$). The specificity of diagnosing VVC by the medically trained cohort was greater than 90% for each medical problem, regardless of whether they had

Table 2. Sensitivity and Specificity for the Diagnosis of Vulvovaginal Candidiasis, Given Patient History of Previous Diagnosis of Vulvovaginal Candidiasis by a Clinician

Medical Problem	Cohort	Prior Diagnosis*	Sensitivity, %	Specificity, %	95% CI
Vulvovaginal candidiasis	Medical†	No	81.3		(54.4–96.0)
		Yes	87.1		(70.2–96.4)
	Subjects	No‡	11.0		(6.6–17.1)
		Yes§	34.5		(29.7–39.7)
Pelvic inflammatory disease	Medical†	No		90.9	(58.7–99.8)
		Yes		92.0	(74.0–99.0)
	Subjects	No‡		92.3	(64.0–99.8)
		Yes§		75.0	(63.0–84.7)
Bacterial vaginosis	Medical†	No		91.7	(61.5–99.8)
		Yes		96.3	(81.0–99.9)
	Subjects	No‡		38.9	(17.3–64.3)
		Yes§		45.9	(36.3–55.7)
Urinary tract infection	Medical†	No		100.0	(78.2–100.0)
		Yes		100.0	(88.8–100.0)
	Subjects	No‡		98.3	(90.6–100.0)
		Yes§		98.9	(96.2–99.9)
Vaginal trichomoniasis	Medical†	No		91.7	(61.5–99.8)
		Yes		96.3	(81.0–99.9)
	Subjects	No‡		70.0	(34.8–93.3)
		Yes§		45.2	(34.3–56.5)

**Had received prior clinical diagnosis of vulvovaginal candidiasis.*
†N = 49.
‡N = 154.
§N = 365.
NOTE: Diagnoses refer to women's assessments of classic presentations of gynecologic problems described in written case scenarios.
CI denotes confidence interval.

previously received a clinical diagnosis of VVC. However, the specificity for diagnosing VVC by subjects was generally less than 90%.

Subjects' management selections for the five urogenital tract infections are reported in Table 3. A majority of women indicated that they would see a physician or nurse for the medical problems portrayed in the case scenarios, whereas a majority (73.3%) of the medically trained cohort indicated that they would use an OTC for the VVC case. The effect of a prior clinical diagnosis of VVC on women's selected treatment for urogenital infections was also examined (Table 3). Twenty-seven percent of subjects who had previously received a clinical diagnosis of VVC reported they would use an OTC for the VVC case, compared with 7% of women who had never previously received a diagnosis of VVC by a clinician ($P<.001$). A greater percentage of subjects who had previously received a diagnosis of VVC by a clinician indicated that they would use OTC antifungal products (an inappropriate choice) to treat the four other urogenital infections than did subjects who had never received a diagnosis of VVC.

When asked what their normal response to a suspected vaginal yeast infection would be, 44% of subjects said they would see a clinician, 20% would call a clinician, and 36% would self-treat with an OTC vaginal antifungal product. These subject responses contrasted with the responses of medically trained women, who responded 3%, 13%, and 84%, respectively ($P=.001$).

Discussion

Physicians frequently encounter situations in which patients inappropriately use a readily available pharmaceutical product; however, such medication misuse rarely invokes major adverse repercussions. Our study indicated that 6.7% of women who had previously received a diagnosis of VVC from a clinician would first use an OTC vaginal antifungal product for classic symptoms of pelvic inflammatory disease. Inappropriate use of OTC vaginal antifungal products by women was also noted for bacterial vaginosis (14.6%) and vaginal trichomoniasis (11.8%).

According to a study made by physicians in Ohio, errors in self-diagnosing VVC have in many cases delayed appropriate therapy.[6] It is unknown whether some women have been seriously injured by these errors. Following incorrect treatment of symptoms, most women eventually seek medical care. A delay in diagnosis and treatment, however, may have negative consequences. For example, untreated PID may lead to infertility, ectopic pregnancy, and death. Acute cystitis can progress to acute pyelo-

Table 3. Subjects' Selected Management for Urogenital Infections

Medical Problem	Cohort	Previous Diagnosis*	% of Women Who Would: Consult Pharmacist	Use OTC†	Consult MD/RN‡	Do Nothing	Other	χ^2	*P* Value§
Pelvic inflammatory disease	Subjects	Yes‖	3.6	6.7	85.0	1.9	2.8		
		No¶	5.7	2.1	82.1	5.0	5.0	14.72	.065
	Medical**	—	0	4.3	89.1	0	6.5		
Bacterial vaginosis	Subjects	Yes‖	5.1	14.6	70.0	4.6	5.7		
		No¶	4.1	6.9	75.9	4.1	9.0	17.23	.028
	Medical**	—	0	6.4	78.9	0	14.9		
Urinary tract infection	Subjects	Yes‖	2.3	2.0	92.1	2.0	1.7		
		No¶	0.7	0	95.0	1.4	2.9	44.03	<.001
	Medical**	—	0	0	80.9	0	19.1		
Vaginal trichomoniasis	Subjects	Yes‖	3.5	11.8	80.0	2.6	2.1		
		No¶	2.1	3.5	87.4	3.5	3.5	15.64	.048
	Medical**	—	0	6.5	87.0	0	6.5		
Vulvovaginal candidiasis	Subjects	Yes‖	2.1	27.4	67.8	2.7	0		
		No¶	2.2	7.3	89.8	0.7	0	81.50	<.001
	Medical**	—	2.2	73.3	24.4	0	0		

**Had received prior clinical diagnosis of vulvovaginal candidiasis.*
† Would buy over-the-counter (OTC) antimycotic for vulvovaginal candidiasis.
‡ Would consult a physician or nurse.
§ Comparison of the responses of all three cohorts: subjects who had not previously received clinical diagnosis of VVC; and medically trained cohort.
‖ N=365.
¶ N=154.
*** N=49.*
NOTE: Diagnoses refer to women's assessments of classic presentations of gynecologic problems described in written case scenarios.

nephritis, sepsis, and renal failure. Delayed or no treatment for bacterial vaginosis can result in preterm labor, premature rupture of membranes, postpartum endometritis, and postsurgical infection. Patients commonly confuse bacterial vaginosis with VVC. To minimize pregnancy-related complications of the more common bacterial vaginosis, perhaps the FDA should consider restricting use of OTC antifungal products during pregnancy.

Many women use OTC vaginal antifungal drugs appropriately and appear to seek proper medical evaluations for symptoms of more serious conditions, such as PID and UTI. In many cases, however, errors in self-diagnosis are facilitated by lack of adequate patient education, and clinicians are often left to address the complications resulting from these inaccurate self-diagnoses.

The FDA contends that women should and will use these products only after having initially received a diagnosis of VVC from a health care provider. Our findings show that one in five women who have used OTC antifungal products for VVC have never previously received a clinical diagnosis of VVC. Furthermore, compared with women who have never received a clinical diagnosis of VVC, those who have received such a diagnosis are more apt to incorrectly diagnose and inappropriately treat the four other urogenital infections with an OTC vaginal antifungal product.

Considering the inherent inaccuracies of diagnosing vaginitis,[7] does a single visit with a clinician provide women with adequate knowledge to discriminate between the ambiguous symptoms of VVC and those of other causes of vaginitis or lower genital tract disease? Our study findings challenge the assumption that once a clinician makes a diagnosis of VVC, a patient would, thereafter, properly self-diagnose. In our study, only 35% of women previously given a clinical diagnosis of VVC were able to correctly diagnose the classic case scenario of VVC. Regardless, the prior diagnosis of VVC by a clinician appears to have some positive effect on self-diagnosis, as only 11% of women who had never received a clinical diagnosis of VVC were able to correctly identify the VVC case scenario. Fifty percent of women who stated they had previously had confirmed VVC claimed they had never seen a clinician for the symptoms presented in the VVC case scenario. This implies that they did not have a classic case, may not have learned the symptoms of VVC, or had learned the symptoms but subsequently forgot.

Do women who have not been medically trained have sufficient knowledge to accurately self-diagnose VVC and select appropriate treatment? The diagnosis of VVC by experienced clinicians is difficult and prone to error even when patient symptoms, clinical signs, and laboratory results are available.[7,8] When carefully studied, no more than one half of women with vaginal complaints are diagnosed correctly by physicians.[7–12] This diagnostic failure is more common for VVC than for vaginal trichomoniasis and bacterial vaginosis.[7,12] Our study demonstrated that medically trained women were three times

more likely to accurately diagnose a classic case of VVC than were women with no medical background. Therefore, some women may be able to diagnose "classic" clinical cases of VVC, but the majority of women are unlikely to do so reliably for the more typical case.

Patient symptoms are not sufficiently reliable to diagnose vulvovaginal candidiasis.[11–13] Pruritus, thought to be the most predictive symptom of VVC, is only 38% accurate as a predictor of true infection.[14] Pruritus, however, is also seen with other types of vaginitis and genital problems, such as herpes simplex virus, pediculosis, contact dermatitis, human papillomavirus, pinworms, and lichen sclerosis.

The proceedings of an FDA advisory committee meeting on OTC vaginal fungicides[15] confirms the dearth of clinical studies that have examined women's capability to self-diagnose *Candida vaginitis.* This FDA committee meeting considered only one study, in which 59% of women who believed their symptoms were caused by a yeast infection were correct, as determined by confirmatory mycologic tests.[16]

However, this study has several serious limitations. The screening enrollment criteria were selectively biased by including only women with a high probability of VVC. Furthermore, subjects were taught symptoms associated with a vaginal yeast infection and self-recognition instructions for the three common types of vaginitis before making a diagnosis.

The generalizability of the current study's findings is limited because the data represent opinions of women from a single southern metropolitan area. The findings may not reflect the responses of an older, nonminority, less well educated group of women, and thus may not be generalizable to other regions or populations. Our conclusions are also based on classic case scenarios rather than actual symptoms experienced by women. Further research is needed on self-diagnosis based on patient symptoms.

Conclusions

Based on our findings, it is likely that women use OTC vaginal antifungal drugs inappropriately to treat potentially more severe gynecologic conditions with similar symptoms. These findings support clinicians' concerns about the inappropriate use of OTC vaginal antifungal products for suspected VVC. Increased and improved patient education by health care providers and the pharmaceutical industry are needed to enhance women's self-diagnosis skills and to optimize women's self-treatment selections for VVC.

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