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Common Complementary and Alternative Therapies for Yeast Vaginitis and Bacterial Vaginosis: A Systematic Review

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This article is a systematic review of the literature regarding the most commonly used complementary and alternative medicine (CAM) therapies for yeast vaginitis and bacterial vaginosis. A search was conducted of all published literature on conventional search engines (PubMed, EMBASE, the Cochrane Registry, CINAHL, LILACS) and alternative medicine databases (Natural Medicines Comprehensive Database, Longwood Herbal Taskforce, and Alternative Medicine Alert), for all studies of the five most commonly used CAM treatments of vaginitis. Inconsistencies in definition of vaginitis, type of intervention, control groups, and outcomes prevented performance of a meta-analysis, and paucity of high-quality studies made ranking by evidence-based scales unsuitable. Lactobacillus recolonization (via yogurt or capsules) shows promise for the treatment of both yeast vaginitis and bacterial vaginosis with little potential for harm. Boric acid can be recommended to women with recurrent vulvovaginal Candidal infections who are resistant to conventional therapies, but can occasionally cause vaginal burning. Because of associated risks in the absence of well-documented clinical benefits, douching remains a practice that should not be recommended for the treatment of vaginitis. Finally, tea tree oil and garlic show some *in vitro* potential for the treatment of vaginitis, but the lack of *in vivo* studies preclude their recommendation to patients for the time-being. The available evidence for CAM treatments of vaginitis is of poor quality despite the prevalent use of these therapies. Well-designed randomized, controlled trials investigating the efficacy and safety of these therapies for vaginitis are needed before any reliable clinical recommendations can be made.

Target Audience: Obstetricians & Gynecologists, Family Physicians

Learning Objectives: After completion of this article, the reader will be able to list the most common complementary and alternative medicine therapies for vaginitis, summarize the data surrounding the efficacy of each therapy, describe the adverse affects of each therapy, and outline which therapies are recommended and not recommended for vaginitis.

Vaginitis is one of the most common reasons a woman visits a gynecologist, and accounts for more than 10 million office visits per year (1). Bacterial

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The authors have disclosed no significant financial or other relationship with any commercial entity.

vaginosis accounts for approximately 40% of vaginitis cases in women of reproductive age, while vulvovaginal candidiasis infections account for 25% (2). Women, particularly those with chronic vaginal symptoms, are increasingly rejecting antimicrobial therapies in favor of alternative remedies (3). In one study, 73% of women with vaginitis symptoms for 2 or more years self-medicated with over-the-counter remedies, spending \$2 to \$1000 per year for such treatments (3). Of these same women, 42% used alternative medicines, of which the most common include lactobacilli replacement therapy (in yogurt

and pills), douches, boric acid, tea tree oil, and garlic. In women with chronic vaginitis and pain, 96% sought relief from complementary therapies (4). Given the relatively high prevalence of complementary and alternative medicine (CAM) use for vaginitis, it is important for women's healthcare providers to be knowledgeable about such therapies.

This systematic review describes five commonly used CAM treatments for the treatment of the most common types of vaginitis (bacterial vaginosis and yeast vaginitis), including evidence supporting their use, dosing recommendations, and potential side effects. We did not address other, less common types of vaginitis for which we found very limited published studies. Furthermore, many CAM studies are characterized by small numbers of patients, inappropriate controls, ambiguous inclusion or exclusion criteria, and unvalidated outcome measures, making usual evidence-based rating such as the U.S. Preventive Task Force scales inappropriate. Nevertheless, we systematically reviewed CAM treatments for vaginitis with the hopes that healthcare providers will be better equipped to discuss their patients' questions, and CAM researchers will be inspired to conduct higher-quality research in this field.

SEARCH CRITERIA USED IN STUDY SELECTION

Five widely used conventional medicine bibliographic databases (PubMed, Cochrane Library, EMBASE, CINAHL, LILACS) and three CAM data websites (Natural Medicines Comprehensive Database, Longwood Herbal Taskforce, and Alternative Medicine Alert) were searched from their inception to November 1, 2002. Searches used the keyword vaginitis intersected with the following terms: complementary, alternative, lactobacillus, yogurt, douche, boric acid, tea tree oil, and garlic. Two of the authors (K.V.K. and N.A.) independently conducted the searches and abstracted data into standardized format.

A meta-analysis was not performed due to the wide range of heterogeneity among the studies, the limited number of studies and subjects for each therapy, the variance in inclusion and exclusion criteria for vaginitis, and other missing criteria according to meta-analysis guidelines such as QUOROM and MOOSE. Given the paucity of published studies, all trials (including *in vitro* studies) were included and studies in languages other than English were also obtained.

SPECIFIC CAM THERAPIES

Each CAM therapy commonly used for vaginitis is discussed separately below, including a rationale and historical context, *in vitro* and *in vivo* data when available, dosing, and adverse effects. A summary of all these CAM studies for bacterial vaginosis is presented in Table 1, and for Candidal vulvovaginitis in Table 2.

Lactobacilli Recolonization: Oral Administration

Treatment of vaginitis by Lactobacilli recolonization was first described in 1908 by Elie Metchnikoff (5), and continues to be the rationale for using yogurt and capsules for this purpose. Recolonization can be accomplished by both oral and intravaginal administration. Successful oral yogurt therapy depends upon the survival of lactobacilli through gastrointestinal processing as vaginal colonization is thought to occur from migration from the anus to the vaginal introitus. Effective oral and topical (vaginal) yogurt treatment requires adherence of exogenous lactobacilli to vaginal cells. *Lactobacillus acidophilus*, the active culture most likely to be added to pasteurized yogurt, survives gastrointestinal digestion, but manifests poor adherence to vaginal epithelial cells compared with Lactobacillus strains derived from the human vagina (6). Furthermore, *L. acidophilus* is not a prominent species in the anal-vaginal ecosystem (7). Due to recent research showing that *L. crispatus* and *L. jensenii* are actually the most common species of vaginal lactobacilli able to restore the acidic vaginal pH via hydrogen peroxide production, attention has turned to using lactobacilli capsules containing these subspecies to replace normal vaginal flora following vaginitis (8).

Only two studies used oral yogurt therapy in the treatment of vaginitis. An open crossover study by Hilton et al. (9), randomized 33 women with recurrent vulvovaginal candidiasis to either eight ounces of *L. acidophilus*-containing yogurt daily or a yogurt-free diet for 6 months. Although a significant three-fold decrease in Candidal infections occurrence in those consuming yogurt, corroborated by a parallel decrease in vaginal candidal colonization diagnosed by wet mount or potassium hydroxide, only 13 women completed the protocol. Of note, eight women who had been initially randomized to the yogurt arm refused to crossover to a yogurt-free diet.

A second crossover study by Shalev et al. (10) examined oral yogurt administration for prophylaxis

TABLE 1 Evaluation of Alternative Therapies for Treating Bacterial Vaginosis

Evaluation Criteria	Therapies			
	Oral Lactobacillus Replacement	Vaginal Lactobacillus Replacement	Tea Tree Oil	Douching*
Number and type of studies	1 RCT with crossover (10)	1 RCT (15)	1 case report (39)	None
Placebo/Control (yes/no)	No	1 case series (16) 1 yes (15) 1 no (16)	2 <i>in vitro</i> studies (37, 38) No	None
Total number of subject (n)	28	64 (15)	1	None
Outcome	50% reduction in episodes of bacterial vaginosis in group eating yogurt enriched with <i>L. acidophilus</i> QD × 2 months compared to group eating pasteurized yogurt (10).	88% of women free of bacterial vaginosis at 2 months after regular yogurt douching (15). 55% eradication of bacterial vaginosis 3 days after treatment (16).	1 patient with recurrent bacterial vaginosis successfully treated with pessary impregnated with tea tree oil (39). <i>In vitro</i> studies showed inhibition of aerobic and anaerobic species (37, 38).	None
Dosing	8 oz–150 cc of yogurt PO QD	10–15 cc yogurt mixed with water. Insert per vagina Qhs or 1–2 gelatin capsules Qhs × 3–7 days	“oo” gelatin capsule with 1–2 drops tea tree oil. Insert per vagina Qhs × 6 days	None
Known side-effects and prevalence	Gastrointestinal distress and rarely lactobacillemia	Rare	Infrequent allergic dermatitis and skin irritation	None
Average cost to patient/day	\$0.50–\$1.50	\$0.50–\$2.00	\$2.00–20.00	None

* There were no studies looking at the effectiveness of douching for bacterial vaginosis. QD, every day; PO, by mouth; Qhs, every night.

against recurrent bacterial vaginosis (BV) and candidal vaginitis. Forty-six patients (20 with BV, 18 with yeast, and 8 with both) were enrolled and randomized so that 23 initially received pasteurized yogurt (without lactobacilli) and 23 received yogurt with live *L. acidophilus* cultures. After 2 months of yogurt ingestion and a yogurt-free “washout period” for 2 months, the women crossed over to the other yogurt group for another 2 months. Vaginal cultures were performed on a regular basis to confirm bacterial vaginosis or yeast vaginitis. Only 28 participants remained at 4 months, and only 7 completed the entire protocol. While the study was able to show a significant reduction in the episodes of bacterial vaginosis and a simultaneous increase in *L. acidophilus* colonization, it showed no significant decrease in the incidence of vulvovaginal candidiasis.

There are no known serious side effects associated with the ingestion of yogurt (11, 12). Yogurt with live, active cultures can cause gastrointestinal disturbance in lactose intolerant individuals (13), and lactobacillemia has occurred in the immunosuppressed (14). However, women with these side effects have

all responded appropriately to standard antibiotic therapy (13).

Lactobacilli Recolonization: Vaginal Administration

Several studies examined the efficacy of topic yogurt to treat bacterial vaginosis. In an unblinded trial by Neri and colleagues (15), 84 pregnant women with bacterial vaginosis were randomized to a twice-daily 7-day dose of yogurt douches (n = 32), acetic acid tampons (n = 32), or no treatment (n = 20). Two months after treatment, 88% of women using yogurt douches and 38% of women using acetic acid tampons compared with 5% of women without treatment were free of bacterial vaginosis (P < .05 between all groups). Another smaller, uncontrolled Japanese study of vaginal douches with yogurt for 3 days for bacterial vaginosis resulted in clinical and laboratory eradication of the bacterial vaginosis in 55% of cases (16). However, this study was limited by the lack of long-term follow-up as patients were only examined 3 days after yogurt douching.

TABLE 2 Evaluation of Alternative Therapies for Treating Vulvovaginal Candidiasis

Evaluation Criteria	Therapies*		
	Oral Lactobacillus Replacement	Boric Acid	Tea Tree Oil
Number and type of studies	2 RCT with crossover (9, 10)	2 case series (32, 34) 1 retrospective case control (35) 1 RCT (33)	5 - <i>in vitro</i> studies (40-44)
Placebo/control (yes/no) Total number of subjects	Yes 21 (9) 26 (10)	No 92, 40 (32, 34) 80 (35) 108 (33)	No 59 of 61 yeast strains were sensitive to garlic. Effects were both fungistatic and fungicidal (51, 52).
Outcome	3-Fold decrease in Candidal infections in those consuming yogurt with <i>L. acidophilus</i> daily (9). No significant decrease in vulvovaginal candidiasis (10).	72-98% effective at 30 days to 6 months after boric acid therapy (32, 34). 81% effective against <i>T. glabrata</i> (35). More effective than Nystatin therapy (33).	<i>In vitro</i> activity against <i>C. albicans</i> , <i>C. glabrata</i> , <i>C. parapsilosis</i> (40).
Dosing	8 oz of yogurt PO QD	"oo" gelatin capsule with 600 mg boric acid power. Insert per vagina Qhs × 14 days	One clove garlic wrapped in unbleached gauze; cursh prior to vaginal insertion Qhs × 6 days
Known side-effects and prevalence	Gastrointestinal distress, especially in the lactose intolerant	Infrequent: vaginal irritation and burning (4% of subjects) (32). <i>Poisonous if ingested</i>	Mild: heartburn, nausea, flatulence, and offensive body odor
Average cost to patient per day	\$0.50-\$1.50	\$0.80-\$2.00	\$0.10-\$0.50

* No studies identified for vaginal lactobacillus replacement for treatment of vulvovaginal candidiasis.

A multicenter, randomized, placebo-controlled study by Parent and colleagues (17) used hydrogen peroxide producing lactobacillus vaginal tablets delivered with estrogen to enhance the acid production of the lactobacilli to eradicate bacterial vaginosis. Thirty-two premenopausal women (8 of whom were pregnant) with bacterial vaginosis were randomized to the Gynoflor vaginal tablets (Medinova Ltd., Zurich, Switzerland) containing *L. acidophilus* and 0.03 mg of estriol or placebo tablet every night for 6 days. A cure was defined as the finding of none or only one of the Amsel et al. criteria (18) (foul-smelling discharge, pH > 4.5, positive amine test, and clue cells on wet mount) for bacterial vaginosis. At 2 weeks, a 75% cure rate occurred in the Lactobacillus group compared with a 25% cure rate in the placebo group (P < .05). At 4 weeks, 88% were cured in the Lactobacillus treatment group and only 22% in the placebo group (P < .05). Although this study showed a beneficial effect of Lactobacillus treatment, the number of patients was small, the follow-up period was short and most importantly, 10 of 17 subjects in the Lactobacillus group and 6 of 15 in the placebo group had only two of four Amsel criteria at study initiation (standard definition of bacterial vaginosis includes at least three criteria). Thus, the cure rate is difficult to compare with studies in which all subjects had bacterial vaginosis by these criteria. Also, *L. acidophilus* was the only species of lactobacilli used, and a higher cure rate may have occurred with *L. crispatus* and *L. jensenii*.

Douching

Douching is still a very common practice in the United States, particularly among women of lower socioeconomic status, those at greater risk of sexually transmitted infections (STIs), and those with vaginitis (19). *In vitro* data show that certain douche preparations selectively kill pathogenic microorganisms while maintaining normal colonization by lactobacillus species, although this has not been confirmed clinically (20). Antiseptic and povidone iodine-containing douches were more likely to kill all the vaginal microflora, including lactobacillus species, whereas saline and vinegar douche preparations caused a transient decrease in the total number of bacteria in the vagina without affecting the number of lactobacilli. New developments include vaginal gels that reduce vaginal pH, turning the vagina into a more hostile environment for pathogenic microbes (21).

In a randomized, clinical trial of povidone iodine vaginal suppositories for bacterial vaginosis (22), 70 women received iodine douches or lactobacilli capsules in the vagina for 5 days, and were followed 3 and 10 days later for subjective and objective signs of improvement. Although both groups improved, the lack of a placebo control group greatly hinders clinically significant conclusions from the study. In addition, the povidone iodine preparations tend to cause a “rebound effect” in which a higher than normal bacterial colonization is seen within weeks of last douching, which would potentially increase the risk of bacterial vaginosis (23, 24).

In a study by Bremond (25), 75 women with either yeast vaginitis or *Trichomonas* (breakdown of each group was not available) were randomly assigned to either a benzydamine 0.1% solution or placebo douche twice a day for 3 days in addition to standard antimicrobial treatments. There was significant improvement in subjective symptoms only (pain, vulvitis, and dysuria) in the treatment group, but the use of conventional medicines in both groups does not allow any conclusions to be made regarding the efficacy of the benzydamine douche as solo treatment for vaginitis.

Several studies have demonstrated that douching is associated with serious sequelae. Douching appears to increase the risk of pelvic inflammatory disease (PID), endometritis, and ectopic pregnancy. In a case-control study of women with PID, those who douched three or more times per month were 3.6 times more likely to have PID compared with a control group of women who did not douche (26). Furthermore, the prevalence of PID was associated with the frequency of douching independent of gonorrhea or chlamydia. Another case-control study revealed that every type of douching behavior was associated with an increased risk of ectopic pregnancy in African American adolescents and young women (27). Importantly, this increased risk persisted even after controlling for douching for perceived infection, which may have represented woman with active sexually transmitted infections. In addition, routine douching for hygiene has been shown to double the risk of acquiring vaginitis (28). Lastly, studies have linked douching with endometritis and salpingitis (29, 30).

Boric Acid

Boric acid is an increasingly popular alternative therapy for women with recurrent and chronic vaginitis symptoms, particularly for recurrent yeast infections or yeast infections caused by nonalbican strains

of *Candida*. Vaginal boric acid is administered in a dose of 600 mg per day for 2 weeks (31). It is often prepared as a powder in a gelatin capsule, which is inserted into the vagina at bedtime. A maintenance dose of boric acid of 600 mg per vagina twice weekly is recommended to prevent recurrence (32).

Four studies document the usefulness of boric acid. In one case series, boric acid cured 98% of patients who previously failed antifungal therapies (32). Ninety-two women with persistent burning, itching and discharge, and evidence of mycotic infection on microscopy who had failed multiple courses of antifungal therapies (including creams, suppositories, and gentian violet), were treated with boric acid vaginal suppositories twice a day for 2 weeks. Thirty-eight of these patients who did not have a completely normal microscopic examination at this point were placed on a prophylactic regimen of once daily boric acid during menstruation only for 4 months. All patients were followed for 6 months and were considered cured if the vaginal microflora was normalized and they were no longer symptomatic.

In a double-blinded, randomized study of 108 yeast vaginitis patients (33), college students received boric acid or nystatin capsules once a day for 2 weeks. Cure rates for boric acid were 92% at 7 to 10 days posttreatment and 72% at 30 days, a statistically significant improvement over the nystatin capsules, which only had a cure rate of 64% at 7 to 10 days posttreatment, and 50% at 30 days posttreatment. In a case series of 40 patients with vulvovaginitis (34), 38 patients (95%) were symptom-free at 30 days postboric acid therapy.

In another study by Sobel and Chaim (35), boric acid was tested against *Torulopsis glabrata* vaginitis, which is increased in prevalence in women with recurrent yeast infections and is less susceptible toazole therapies. Sixty symptomatic women with either *T. glabrata* infection or a mixed infection with coexistent bacterial vaginosis were included. Clinical improvement occurred in 81% and mycological eradication in 77% of the women.

Potential side effects of boric acid include vulvovaginal burning, especially in the postmenopausal patient or those with an extensive excoriation, and male dyspareunia if intercourse occurs shortly after treatment (32, 35). In the study by Jovanovic et al. (32), side effects occurred in 4% of the 92 patients studied, but none were serious.

Tea Tree Oil

Tea tree oil (*Melaleuca alternifolia*) appears effective as an antibacterial therapy as well as an antifun-

gal agent. Tea tree oil contains Terpinen-4-ol and other terpenes, which are responsible for the majority of its antimicrobial action (36). The mechanism is thought to be the disruption of the cell membrane, allowing potassium ion leakage, which leads to loss of chemiosmotic control and, therefore, causes rupture and destruction of the bacterial or fungal cell walls (37, 38). In 1991, Blackwell (39) reported a case of chronic bacterial vaginosis successfully treated with tea tree oil in a vaginal pessary. Since then, multiple *in vitro* studies have shown tea tree oil to inhibit both anaerobic and aerobic bacteria (37, 38). In addition, the data also show that all lactobacilli species tested were appreciably more resistant to the tea tree oil than the organisms associated with bacterial vaginosis. The mean inhibitory concentration at which 90% of organisms were inhibited (MIC₉₀) was at least two-fold greater for lactobacilli species compared with species found in bacterial vaginosis.

After the discovery of the antibacterial properties of tea tree oil, studies turned to the antifungal activity of *M. alternifolia*. *In vitro* studies showed action against multiple candidal species, including *Candida albicans*, *C. glabrata*, and *C. parapsilosis* (40). Intravaginal preparations were tested including pessaries, intravaginal gel, and douche preparations—all but one were rare Candidal species was susceptible to concentrations of $\leq 0.5\%$ tea tree oil. Multiple other observational studies also support the antifungal activity of tea tree oil (41–44).

Several products using tea tree oil as an active ingredient have been developed to treat vaginal infections. Typically, one to two drops of tea tree oil are placed into a gelatin capsule and the remainder of the capsule is filled with calendula oil, vegetable oil, or water (45). Two capsules are inserted into the vagina at night for up to 6 nights. A reported toxicity of tea tree oil is allergic contact dermatitis. It appears that the d-Limonene was the most common allergen in tea tree oil, responsible for allergic eczema, which sometimes occurs (46). Unfortunately, no clinical trials have been done and the true prevalence of side effects from tea tree oil is unknown. To date, the only clinical data available are case reports.

Garlic

Garlic was nicknamed the “Russian penicillin” for its use as a topical and systemic antimicrobial agent (47, 48). Allicin, its active ingredient, forms as a metabolic product of crushed garlic. Allicin has antimicrobial effects *in vitro* against many bacteria and

fungi in its natural form, however, much of the antimicrobial effect is lost when the garlic is dried or powdered or the oil extracted. Crude garlic extract *in vivo* inhibits both Gram-negative bacteria (*E. coli*, *Proteus spp*, *Salmonella*, *Serratia*, *Enterobacter*, *Pseudomonas*, *Klebsiella*) and Gram-positive bacteria (*Staphylococcus aureus*, *S. pneumonia*, *S. sanguis*, *Group A Streptococcus* and *Bacillus anthracis*) (48–50). In addition, garlic has also been shown *in vitro* to have antifungal properties that led some to investigate its usefulness to treat yeast vaginitis.

Sandhu and colleagues (51) tested 61 yeast strains, including 26 strains of *C. albicans* isolated from the vagina, cervix and buccal mucosa of patients with vaginitis, against aqueous garlic preparations. All but two strains of *C. albicans* proved sensitive to the garlic preparation. The effects were both fungistatic and fungicidal. In a similar study, all 22 isolates of *C. albicans* obtained from women with active vaginitis were inhibited by the aqueous garlic extract. Using a garlic preparation of 200 ml of aqueous garlic supernatant in a dilution of 1:1024, fungi were both inhibited and killed. At temperatures of 37°C, the activity of garlic was mostly fungicidal, however, when the temperature dropped below body temperature, the activity was mostly fungistatic (52).

Although numerous clinical trials exist using garlic for coronary artery disease and hypercholesterolemia, no such trials have evaluated the effectiveness of garlic to treat vaginitis. Although garlic has promising *in vitro* data to treat Candidal vaginitis, there are no data for bacterial vaginosis. The typical dosing of garlic is one clove wrapped in unbleached gauze, then crushed just before vaginal insertion. This is done every night for up to 6 nights (11).

Potential side effects of garlic are known from trials for other purposes. Garlic has no chronic toxicity, but taken orally, it may cause heartburn, nausea, diarrhea, flatulence, bloating, and an offensive body odor. Prolonged topical use can lead to allergic reactions or chemical burns (53).

CONCLUSION AND RECOMMENDATIONS

To date, the evidence for CAM therapies for vaginitis largely is composed of inconclusive, poorly controlled studies and *in vitro* evaluations. The role for vaginal recolonization of lactobacilli will be clarified in the next few years, when data from the newest Phase III trials of *L. crispatus* and *L. jensenii* are released. Currently, poorly designed randomized clinical trials indicate some promise for its use in bacterial vaginosis and candidiasis without risk of

serious adverse reactions in immunocompetent women. Yogurt can be messy and some women may be reluctant to insert it vaginally; compliance may be enhanced with a vaginal suppository. Several studies have demonstrated that douching is associated with serious sequelae, including PID, endometritis, and ectopic pregnancy (26–30). Due to these associated risks in the absence of strong clinical evidence of benefit, douching is not recommended to treat vaginitis. Boric acid has promise for patients with chronic symptoms of yeast infections with or without concurrent bacterial vaginosis who have previously failed traditional topical and systemic antifungal therapies (32). Boric acid has not been evaluated for use in pregnancy and is not recommended because of incomplete data on absorption of boric acid during pregnancy. The side effects of skin irritation are rare and occur more often when the boric acid leaks from the suppository capsule. Tea tree oil shows some biologic plausibility *in vitro* for both yeast vaginitis and bacterial vaginosis and garlic has inhibited *Candida* growth in the laboratory, but clinical trials are needed before either can be recommended to patients. Tea tree oil also can cause a bad allergic rash, the prevalence of which is unknown, whereas garlic has no serious side effects.

Future studies on CAM therapies for vaginitis need to be randomized and placebo controlled, using clearly defined diagnostic criteria and validated outcomes, and including longer periods of follow-up. In addition, data on patient satisfaction, side effects, and cost should be obtained. Patients may be frustrated by conventional medicines because too often, they only produce temporary relief, rather than a long-term shift in vaginal flora. Additionally, women may be given conflicting information about the cause of their vaginitis and exaggerated predictions regarding the effectiveness of conventional treatment. Finally, many women incorrectly self-diagnose the cause of their vaginitis (54). Therefore, it is unclear whether they are turning to CAM therapies hoping to find a more effective cure (4) or because they have used an inappropriate conventional medicine. To best serve our patients with vaginitis, we need higher-quality data concerning alternative therapies and improved means for diagnosing vaginitis correctly. In the meanwhile, these CAM therapies although currently lacking high-quality evidence for their use, offer some hope for improved vaginitis treatments in the future.

Acknowledgment—The authors wish to thank David Eschenbach, MD for his editorial advice.

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