Effect of Yogurt Containing Lactobacillus Acidophilus on Vulvovaginal Candidiasis Symptoms

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Abstract

Vulvovaginal Candidiasis (VVC) is a prevalent gynecologic problem, affecting women at least once in their lives, and poorly impacting their daily activities and productivity. Yogurt containing Lactobacillus acidophilus is a non-pharmacological, effective method that helps alleviate VVC symptoms. ***The study aimed*** to evaluate the effect of yogurt containing Lactobacillus acidophilus on VVC symptoms. ***A quasi-experimental research design*** (nonequivalent control group) was used. **Setting**: The research was done at obstetric and gynecological outpatient clinics in University Maternity Hospital in Shebin-Elkoom, Menoufia Governorate, Egypt. **Subjects**: A purposive sampling technique was employed to recruit 80 women, who were assigned to a yogurt group and a control group (40 for each). ***Two tools to collect data*** were utilized: a semi-structured interviewing questionnaire to assess general characteristics of women, health habits, and VVC symptoms questionnaire. **Results:** the mean age in the yogurt group was 28.1 ± 5.7 years compared to 27.2 ± 5.4 years in the control group; most of the women in both groups exhibited improper health habits and complained of moderate to severe VVC. After utilizing yogurt containing lactobacillus, most of the VVC symptoms, such as vaginal itching, burning sensation, vaginal itching, and dyspareunia, were improved significantly and faster in the yogurt group, compared to the control group, with statistically significant differences. ***The study concluded*** that yogurt containing Lactobacillus acidophilus has a beneficial effect in improving the symptoms of VVC, and can suppress the Candida growth. **Recommendation:** Increase women's awareness about healthy practices to prevent VVC occurrence and recurrence, and provide information on the effectiveness of non-pharmacological methods for symptom relief in gynecological clinics and healthcare centers.

Keywords: Yogurt, Lactobacillus Acidophilus, Vulvovaginal Candidiasis.

Introduction:

Vulvovaginal candidiasis (VVC) is a prevalent vaginal infection caused by the fungus Candida albicans and is the second most common cause of vaginitis following bacterial vaginosis ***(Farr et al., 2021)***. A significant proportion of women, particularly those of reproductive age, are affected. Approximately 70-75% of women have symptomatic VVC at least once in their lifetime, with 40-50% experiencing one recurrence and 5-8% facing recurrent infections, defined as three or more episodes annually ***(Chatzivasileiou & Vyzantiadis, 2019; Nyirjesy et al., 2022)***. The risk of developing VVC is around 20% in healthy women, increasing to 30-50% during pregnancy, highlighting the need for effective management and treatment strategies ***(Bagga & Arora, 2020).***

Vulvovaginal candidiasis ranges from asymptomatic to severe symptomatic infections. The most commonly reported symptoms include intense vaginal and vulvar itching and irritation, which may extend to the perineal area and are often the predominant complaints. Additional symptoms may include pain or soreness, vulvar swelling, redness, a burning sensation, pain during intercourse, painful urination, fissures, excoriation, and a characteristic thick, white, curd-like vaginal discharge, often accompanied by an unpleasant odor and significant genital discomfort ***(Venugopal et al, 2021)***. Beyond physical symptoms, many affected women report psychological and social impacts, such as emotional distress, anxiety, reduced self-esteem, impaired occupational performance, and disruptions in both sexual and emotional relationships ***(Gigi et al., 2023)***.

Candida is a yeast that naturally inhabits the vagina and is typically kept in balance by beneficial bacteria such as Lactobacillus. When this balance is disrupted, Candida can overgrow, leading to vulvovaginal candidiasis (VVC). Various factors can contribute to this imbalance, including stress, poor nutrition, sleep disturbances, hormonal fluctuations, certain illnesses, and specific medications. Additionally, pregnancy and prolonged use of broad-spectrum antibiotics, as well as hormonal therapies like hormone replacement therapy and contraceptives, can increase the risk of developing VVC by altering the vaginal environment ***(Faustino et al., 2025)***. The use of corticosteroids can lead to an overgrowth of Candida species due to their immunosuppressant effects. This overgrowth becomes more likely when the body's natural defenses are weakened. Additionally, women with uncontrolled diabetes, as well as those with immune-compromising conditions such as HIV infection or cancer, face a significantly higher risk of developing vulvovaginal candidiasis ***(He et al., 2022)***. In such cases, the infection may become more severe, recurrent, or even systemic, posing serious health risks and presenting challenges for effective treatment.

Furthermore, a higher chance of Candida overgrowth has been linked to specific behavioral risk factors. These factors include wearing tight-fitting clothing, wet or non-breathable undergarments (such as nylon), and practicing poor personal hygiene. Other contributing factors encompass certain sexual behaviors and contraceptive methods, frequent use of vaginal douches, and the application of irritating substances like perfumed feminine hygienic products. Additionally, unhealthy dietary habits, particularly those high in sugar and refined carbohydrates, may promote the proliferation of Candida species ***(Waikhom et al., 2020)***.

Uncontrolled or poorly managed VVC can lead to severe symptoms, recurrent VVC infections, and increase the risk of other infections like bacterial vaginosis or STIs. Additionally, it can increase the risk of pelvic inflammatory disease (PID), cause emotional distress, and impair sexual intimacy, ultimately affecting relationships and overall well-being ***(Thomas-White et al., 2023)***.

Antifungal therapy remains the mainstay for treating vulvovaginal candidiasis (VVC), including both oral and intravaginal agents; however, it is not without limitations. Many patients experience adverse effects, such as gastrointestinal discomfort, local irritation, and, in some cases, the development of increasing antifungal resistance. These limitations highlight the value of non-pharmacological interventions, which are generally low-risk, affordable, and patient-friendly ***(Zahedifard et al., 2023; Mändar et al., 2023)***. Non-pharmacological interventions, including probiotics like Lactobacillus, dietary modifications, and proper hygiene practices, provide a safer, more affordable, and accessible alternative or complement to conventional antifungal management. These interventions focus on promoting and preserving a balanced vaginal microbiome, boosting the body's natural defenses against pathogens like Candida ***(Zahedifard et al., 2023; Liu et al., 2023)***. Non-pharmacological strategies are becoming an essential component of a holistic and sustainable approach to managing vaginal infections. Moreover, natural remedies like yogurt and honey have shown potential in managing vulvovaginal candidiasis, offering women an affordable and effective option ***(Zahra et al, 2019)***.

According to ***Nachum et al. (2025)***, probiotics, specifically Lactobacilli, are the predominant microorganisms in the normal vaginal microbiota and are essential for preventing infections by inhibiting the Candida growth, because they produce antimicrobial substances such lactic acid, hydrogen peroxide, and compounds that resemble bacteriocin. Yogurt, which contains live beneficial bacteria such as *Lactobacillus acidophilus*, can serve as a natural probiotic. These beneficial bacteria help sustain a healthy balance in the vaginal microbiota and may aid in restoring microbial equilibrium when disrupted, thereby reducing the risk of *Candida* overgrowth ***(Wu et al, 2025)***. However, the yogurt consumed must be plain and unsweetened, as added sugars, flavorings, or fruit can promote the growth of *Candida* by providing a nutrient-rich environment favorable for fungal proliferation ***(Fares et al, 2017)***. Because probiotic lactobacilli are generally regarded as "safe" and play a vital role in vaginal health, they are frequently used as an alternative or supplement to traditional antifungals for treating

vaginal infections and restoring the vaginal microbiome ***(Liu et al., 2023).***

Nurses play a vital role in providing essential health education and guidance to women to increase their knowledge and awareness regarding the prevention and management of vulvovaginal candidiasis (VVC). Through targeted health promotion efforts, nurses can encourage a holistic approach to VVC management, including lifestyle modifications, stress management, and other supportive measures, including adoption of healthy behavioral practices, such as maintaining proper personal hygiene, following a balanced diet, and utilizing probiotic-rich foods like yogurt containing Lactobacillus acidophilus both orally and topically. These measures have been shown to alleviate symptoms, reduce the recurrence of VVC, and help prevent further complications ***(Mashatan et al., 2023)***.

Significance of the study

Vulvovaginal candidiasis (VVC) is a common and debilitating vaginal infection, causing significant health issues for many women. Globally, an estimated over 138 million women experience recurring vaginal candidiasis each year, with over 372 million of them affected during their reproductive years ***(Denning et al., 2018)***. About 75% of women will have at least one VVC infection in their lifetime, and 40-45% will have more episodes (≥2). Furthermore, 10-20% of women develop complicated or recurring vaginal candidiasis each year (≥4), which requires specialized diagnosis and treatment (***The Centers for Disease Control and Prevention, 2021***).

In Egypt, the true prevalence of VVC remains unclear, largely due to the common practice of self-diagnosis and self-treatment, which often leads to underreporting. VVC infection, if left untreated or inadequately managed, can progress to chronic or complicated forms, posing more serious health risks. The infection also carries notable psychosocial consequences: many women report experiencing emotional distress, anxiety, low self-esteem, and disruptions in sexual and intimate relationships (***Gigi et al., 2023***). Persistent symptoms such as itching and discomfort may interfere with daily activities, reduce work performance, and significantly impair overall quality of life. A survey conducted in Egypt has shown a significant rise in the prevalence of VVC, affecting an estimated 70% to75% of reproductive-age females at least once in their lives. VVC was found to be twice as high in women under the age of 40 compared to older women, and was increased in women who engaged in sexual activity before the age of 20. About 25% of pregnant women were found to harbor *Candida* species in the vaginal area ***(Abdullah et al., 2020)***.

In Egypt, VVC remains a widespread and sensitive health issue. Many women associate vaginal candidiasis with shame and discomfort, often delaying medical consultation until the condition becomes severe. This underscores the need for increased awareness of VVC risk factors, clinical manifestations, prevention strategies, and accessible management options. Although some research has explored the probiotics role in the management of VVC, there remains a significant gap in studies evaluating the use of yogurt containing Lactobacillus acidophilus.

Conducting the current research will contribute to nursing education, practice, and research through; providing the maternity and community health nurses with the current knowledge about the importance of the non-pharmacological modalities regarding vaginal infections, including yogurt containing Lactobacillus acidophilus on vulvovaginal candidiasis symptoms; increase the awareness for nurses in the health care settings on the VVC management so they can providing health education for women to prevent the occurrence and recurrence of VVC. Moreover, this research will contribute to nursing research regarding the VVC prevention and management. In Egypt, it is pointing to developing strategies to improve vulvovaginal candidiasis symptoms among women. Therefore, the present study seeks to contribute to the existing literature by investigating the effectiveness of yogurt-based probiotic interventions in alleviating VVC symptoms.

Aim of the study

The study aimed to evaluate the effect of yogurt containing Lactobacillus acidophilus on vulvovaginal candidiasis symptoms, which was achieved through the following objectives:

1. Determine the health habits of the women complaining of VVC.

2. Assess women's signs and symptoms of VVC,
3. Evaluate the effect of utilizing yogurt containing Lactobacillus Acidophilus among women on alleviating the signs and symptoms of VVC.

Operational definition

Yogurt Containing Lactobacillus**:**

In the current study, utilizing Yogurt Containing Lactobacillus Acidophilus implies eating a cup of yogurt daily and applying it vaginally for women complaining of VVC. It is a type of yogurt containing beneficial bacteria such as Lactobacillus which is already available in the markets such as Greek yogurt.

Research Hypothesis:

To achieve the study's aim, the research hypothesis is formulated as follows:

Women who utilize yogurt containing Lactobacillus acidophilus will have better improvement of VVC symptoms than the control group who receive routine medical care only.

Subjects and Methods

Research Design:

A quasi-experimental research design (nonequivalent control group) was used to accomplish the study's aim. Non-equivalent quasi experimental design refers to a research methodology in which participants are not randomly assigned to treatment or control groups, and the researchers aim to evaluate the effect of an intervention ***(Rajiv et al. 2020).***

Study Setting:

The research was conducted at obstetric and gynecological outpatient clinics in University Maternity Hospital in Shebin-Elkoom, Menoufia Governorate, Egypt. All outpatient clinics consisted of 22 clinics with 45 different specialties. Obstetric and gynecological outpatient clinics located in the first floor of the hospital. It provided free health services to women such as antenatal care, counseling for appropriate contraceptive methods, diagnosis and treatment of any gynecological problems such as candida. According to Statistics department at 2024, obstetric and gynecological outpatient clinics had a high flow rates of women from rural and urban areas around 5962 women attending yearly. Obstetric and gynecological outpatient clinics consisted of two well-equipped rooms with examination bed, ultrasonography, and other facilities regarding gynecological problems. There was a waiting room for women in which interview and health education were provided to the selected women individually.

Study Subjects:

Eighty women were selected using a purposive sampling technique and assigned to a study "yogurt group", and a control group (40 women in each group). The sample was selected according to ***inclusion*** criteria: reproductive-aged (18- 45 years) women diagnosed with VVC, suffering from white vaginal discharge accompanied by symptoms such as itching, burning vaginal sensation, dyspareunia and dysuria. Pregnant women, and those with other vaginal infections (e.g., bacterial vaginosis or trichomoniasis) were ***excluded***. The yogurt group consisted of women who consumed yogurt containing Lactobacillus acidophilus orally and applied it vaginally, in addition to receiving routine medical care. The control group received routine medical care only.

The sample size was determined using a statistical formula based on the rule of sum and sample equation, informed by relevant studies and hospital admission statistics from the previous year:

$$\mathbf{n} = \frac{t^2 \times p\,(1-p)}{m^2}$$

n = required sample size
t = confidence level at 95% (standard value of 1.96).
p = estimated prevalence of vulvo-vaginal candidiasis.
m = margin of error at 5% (standard value of 0.05) ***(Smith, 2013)***

Data collection tools: Two data collection tools to achieve the research hypothesis were created and used by the researchers based on the literature.

Tool-1) A semi-structured interviewing questionnaire consisted of two parts;

(a) Demographic characteristics of women included age, level of education, occupation, marital status, and residence.

(b) Health habits. This section consisted of 14 questions related to tight-fitting, wet, and nylon underwear; personal hygiene; excessive coitus; prolonged use of hormonal contraceptives; frequent vaginal douches; using irritant substances during genital area washing; using vaginal narrowing products; smoking; insufficient sleep hours; extended antibiotic use; and poor dietary habits, among others. Women's responses to questions about their health habits before the intervention were scored as 2 for 'yes,' 1 for 'sometimes,' and 0 for 'no.' These scores were then converted into relative frequencies, expressed as percentages.

Tool-2) VVC symptoms questionnaire (VVCSQ) was developed by the researchers, informed by existing literature***; Wei et al. (2024) & Erekson et al (2013***). The questionnaire assessed symptoms such as vaginal itching, discharge, burning sensation, and dyspareunia. Women's responses to the questions regarding symptoms of VVC, which were self-reported by the participants, were scored, where each symptom and sign received a numerical score as follows:

VVC Symptom Severity Score, which evaluates the **five main symptoms** of VVC:

Symptom	Score range	Score
Vaginal itching	0–3	None (0), mild (1), moderate (2), to severe (3)
Burning sensation	0–3	None (0), mild (1), moderate (2), to severe (3)
Discharge (amount & type)	0–3	None (0), scant (1), moderate (2), to thick, curdy discharge (3)
Erythema/Edema	0–3	No redness (0), mild (1), moderate (2), to severe inflammation (3)
Dyspareunia	0–3	None (0), mild (1), moderate (2), to severe (3)

The symptom score was a composite score comprising the sum of all individual scores, Then the scores were converted to relative frequencies, “percentages”. Total score range from 0 to 15; **0–4** for Mild, **5–9** for Moderate, and **10–15** for Severe conditions. Then the scores were converted to relative frequencies, “percentages”.

Tool validity and reliability:

The tools underwent validation by a panel of five experts in Maternity and Community Health Nursing, who assessed content validity and provided feedback on sentence clarity and content appropriateness. Based on their input, modifications were made. The questionnaire demonstrated reliability with a Cronbach's alpha (α) value of 0.72.

Supportive material

The researchers developed a simple Arabic brochure based on relevant literature, providing concise information on vulvovaginal candidiasis, its symptoms (***National Library of Medicine(2024), (Ministry of health of the Kingdom of Saudi Arabia (2023***). And the route of utilizing the yogurt (orally and vaginally). The brochure, which included photos and illustrations for clarity, was distributed to participants after data collection and before yogurt use. Its content validity was verified by a panel of three nursing and medical experts, who assessed its clarity, comprehensiveness, and applicability.

Ethical consideration

Ethical approval for the study was obtained from the Research Ethics Committee of the Faculty of Nursing, Menoufia University (Approval No. 1045). Official permission to conduct the study and collect data was granted by the Director of the Maternity Hospital at Menoufia University, Egypt. The researcher explained the purpose, importance, and benefits of the study to all participants, assuring them that their participation was entirely voluntary and that they had the right to refuse or withdraw at any time without providing a

reason and without any impact on the care they received. Participants were also informed that all collected data would remain confidential, anonymous and would be used solely for research purposes. Written informed consent was obtained from each participant before data collection.

Pilot Study:

A pilot study was done with 8 women, representing 10% of the total sample, to test the data collection tool's clarity and feasibility and estimate the time needed to complete the questionnaire. These participants were not included in the final sample.

Field work:

Data were collected over six months (January 2024 to June 2024) from 80 women diagnosed with vulvovaginal candidiasis (VVC). The data collection process consisted of four phases: (a) preparatory, (b) assessment and planning, (c) implementation, and (d) follow-up and evaluation.

a) Preparatory Phase:

Prior to initiating the study, ethical approval was obtained from the Research Ethics Committee, and official permissions were secured from the hospital administration and healthcare providers at Menoufia University Maternity Hospital. Eligible women diagnosed with VVC were approached, and the study's purpose, significance, and potential benefits were clearly explained to them. Informed consent was obtained from those who agreed to participate.

b) Assessment and planning **Phase:**

During this phase, baseline data were collected from both groups. This included sociodemographic information such as age, educational level, marital status, residence, and occupation (Tool 1-a). Participants were also interviewed regarding their health habits and potential risk factors for VVC (Tool 1-b). All participants were assessed for signs and symptoms of VVC, including white cheesy vaginal discharge, burning sensation during urination, vaginal itching, vulvar redness and edema, and pain during intercourse. These findings were documented using the VVC symptoms questionnaire (Tool 2). The total time required to complete all assessment tools ranged from 20 to 30 minutes per participant. To ensure group separation, the researcher designated specific days per week for enrolling participants into the yogurt group and other days for enrolling the control group till reached the required sample size.

c) Implementation Phase:

Participants were then allocated into two equal groups (n = 40 each). The yogurt group received the routine medical treatment in addition to a probiotic intervention, which included:

- Daily consumption of one cup of yogurt containing *Lactobacillus acidophilus,* which is available in the markets as Greek yogurt.
- Twice-daily vaginal application of cold, plain yogurt: the yogurt was applied externally to the vulva and then inserted intravaginally using a clean applicator or clean fingers.
- Furthermore, participants in the yogurt group received oral and written instructions for maintaining good genital hygiene with application of the yogurt:
  - Keep the genital area clean and dry: Wash the vulva with warm water, avoiding harsh soaps or shower gels that can cause dryness and irritation.
  - Avoid irritating soaps (including bubble bath), vaginal sprays, and douches unless medically advised.
  - Menstrual hygiene: Change sanitary pads frequently during the period to prevent bacterial growth and odor. Consider using breathable underwear and avoiding unnecessary sanitary wear to promote airflow.
  - Choose comfortable underwear: opt for loose, breathable cotton underwear to prevent moisture buildup. Avoid tight-fitting clothing and synthetic materials that can trap moisture and lead to irritation.
  - Practice good hygiene habits: avoid over-washing, which can strip away healthy bacteria and lead to infections, and pat dry instead of rubbing ***(Graziottin, 2024)***.

The **control group** received only the routine medical treatment provided for women with VVC in the obstetric and gynecological outpatient clinics. Researchers interacted with participants in the control group during their regular obstetric and gynecological clinic visits, addressing any questions and conducting the same baseline and follow-up assessments as performed in the yogurt group.

d) Follow-up and Evaluation Phase:

In this phase, all participants were followed up through social media platforms and telephone communication to ensure adherence to the intervention protocol. After one week, both groups were re-evaluated during scheduled outpatient clinic visits to assess the presence or absence of vulvovaginal candidiasis (VVC) symptoms. The same assessment tool used at baseline (**Tool 2**) was utilized for post-intervention evaluation, allowing for a consistent comparison of symptom changes between the two groups.

Statistical Analysis

Data were coded, entered, and analyzed using the Statistical Package for the Social Sciences (SPSS), version 20. Prior to analysis, the dataset was checked for accuracy, coding completeness, and entry errors. Descriptive statistics were used to summarize participants' demographic and clinical characteristics. Inferential statistics were employed to address the study's research questions. Specifically, the Chi-square (χ^2) test was used to compare categorical variables between groups, while the independent-sample t-test was applied to assess differences in means between the two study groups. A p-value of less than 0.05 was considered statistically significant.

Results

Patients in the yogurt and control group were aged 18 - 45 years, with a mean age = 28.1 ± 5.7 years and 27.2 ± 5.4 years, respectively. Baseline data were comparable in the two groups, as shown in **Table 1**, which shows the demographic characteristics. In which most of the women in the yogurt and control groups had primary and secondary education 70% and 75%, and were married, respectively. Moreover, the majority of them in both groups were housewives 67.5%, and 72.5%, and from rural areas 82.5%, and 77.5% respectively. No statistically significant difference was found between the groups.

As regards the health habits, two-thirds of the women in both groups had poor hygiene, such as improper cleaning from front to back and dryness of the genital area, and who did not change their underwear frequently represented 65% in the yogurt group compared to 62.5% in the control group. The majority of the women in both groups used an irritant substance in cleaning the genital area, representing 60% in the yogurt group compared to 55% in the control group. Moreover, two-thirds of women in both groups used excessive vaginal douching represented 65%, and 60% respectively. Concerning the diet, most of the women in both groups were eating excessive carbohydrates, sugar, and/or spicy food (77.5% and 72.5%), and had insufficient sleeping hours (80% and 75%), respectively. Most of the women in both groups suffered from stress or psychological problems (45% and 55%), and most of them smoked actively or passively (62.5% and 57.5%) in the control group, respectively. No statistically significant differences between the two groups were found concerning health habits (**Table 2**)

Regarding the women's vulvovaginal candidiasis symptoms pre-intervention, it was found that most of the women in both groups had moderate or severe vaginal discharge, represented 90% and 87.5 %, who had dysuria represented 62.5% and 65%, and who had vulvo-vaginal pruritus represented 75% and 65% in the yogurt and control groups respectively. Moreover, about half of the women in both groups had vulvo-vaginal erythema with swelling, represented 42.5% and 45%, and who had dyspareunia, represented 45% and 55% in the yogurt and control group, respectively. No statistically significant difference between the groups was found (**Table 3**).

After 7 days of utilizing the yogurt, the yogurt group improved significantly on several symptoms better than the control group, with statistically significant differences found between the groups at $p < 0.05$, except the

symptom of vulvo-vaginal redness & swelling was borderline at p = 0.09 (**Table 4**).

The current study demonstrated a significantly faster improvement in vulvovaginal candidiasis (VVC) symptoms among participants who received yogurt containing *Lactobacillus acidophilus* alongside routine medical treatment, compared to those who received routine care alone. Specifically, the average number of days for symptom relief in the yogurt group versus the control group was as follows: vulvovaginal itching (2.57 ± 0.37 vs. 3.88 ± 0.7), cheesy vaginal discharge (2.01 ± 0.12 vs. 3.03 ± 0.5), burning sensation during urination (3.37 ± 0.31 vs. 4.37 ± 0.36), vulvovaginal redness and edema (2.33 ± 0.44 vs. 3.76 ± 0.34), and dyspareunia (3.36 ± 0.55 vs. 4.77 ± 0.37). The total time to symptom resolution was also significantly shorter in the yogurt group (6.67±0.7 days) compared to the control group (8.82±0.3 days), with all comparisons showing highly statistically significant differences ($p < 0.001$) (**Table 5**).

Table 1: Frequency distribution of the Studied Samples' Demographic Characteristics (n=80).

Demographic Characteristics	Yogurt Group (n=40) n (%) / ($\bar{x} \pm S$)	Control Group (n=40) n (%) / ($\bar{x} \pm S$)	Test	p-value
Age ($\bar{x} \pm S$) in years Range (18-45 years)	28.1 ± 5.7	27.2 ± 5.4	t =0.724	0.471
Educational level - Primary/ preparatory education - Secondary education. - University education	 14 (35%) 14 (35%) 12 (30%)	 16 (40%) 14 (35%) 10 (25%)	$\chi2$= 0.3142	0.854
Occupation - Working - Housewife	13(32.5%) 27(67.5%)	11(27.5%) 29(72.5%)	$\chi2$= 0.0595	0.807
Marital status: - Unmarried. - Married.	 12 (30%) 28 (70%)	 10 (25%) 30 (75%)	$\chi2$= 0.0627	0.802
Residence: - Rural - Urban	 33(82.5%) 7(17.5%)	 31(77.5%) 9(22.5%)	$\chi2$= 0.0781	0.779

Table 2: Distribution of the samples according to their health habits (n=80).

Health habits	Yogurt Group (n=40) n (%)	Control Group (n=40) n (%)	$\chi2$	p-value
Poor hygienic measures, " cleaning from front to back, dryness & changing underwear frequently"	26(65%)	25(62.5%)	0.001	1.00
Use irritant substances as soap & perfume	24(60%)	22(55%)	0.051	0.821
Excessive vaginal douching	26(65%)	24(60%)	0.053	0.817
Prolonged use of contraceptive methods	23(57.5%)	19(47.5%)	0.451	0.502
Excessive Sexual intercourse	10(25%)	8(20%)	0.072	0.789
Prolonged use of antibiotics	7(17.5%)	12(30%)	1.104	0.293
Prolonged use of corticosteroids	5(12.5%)	7(17.5%)	0.098	0.754
Wear tight or non-cotton underwear	20(50%)	24(60%)	0.455	0.50
Poor diet, such as excessive carbohydrates, sugar, or spicy foods	31(77.5%)	29(72.5%)	0.67	0.796
Always have insufficient sleeping hours	32(80%)	30(75%)	0.072	0.789
Have stress & psychological problems	18(45%)	22(55%)	0.450	0.502
Have smoking	25(62.5%)	23(57.5%)	0.052	0.819
Suffering from chronic diseases as Diabetes Overweight/obesity	 3(7.5%) 10(25%)	 1(2.5%) 17(42.5%)	 0.263 2.013	 0.608 0.156

Numbers are not mutually exclusive, i.e., some women reported more than one health habit.

Table 3: Distribution of the samples based on their vulvovaginal candidiasis symptoms at pre-intervention (n=80).

Symptoms	Pre-intervention		χ2	p-value
	Yogurt Group (n=40) n(%)	Control Group (n=40) n(%)		
Cheesy Vaginal discharge				
- No	0	0	0.2558	0.8799
- Mild	4(10%)	5(12.5%)		
- Moderate	18(45%)	16(40%)		
- Severe	18(45%)	19(47.5%)		
Burning during urination				
- No	3(7.5%)	4(10%)	1.983	0.575
- Mild	12(30%)	10(25%)		
- Moderate	16(40%)	12(30%)		
- Severe	9(22.5%)	14(35%)		
Vulvovaginal itching				
- No	2(5%)	3(7.5%)	1.914	0.590
- Mild	8(20%)	11(27.5%)		
- Moderate	20(50%)	14(35%)		
- Severe	10(25%)	12(30%)		
Vulvo-vaginal erythema with swelling	4(10%)	3(7.5%)	1.276	0.734
- No	19(47.5%)	15(37.5%)		
- Mild	12(30%)	16(40%)		
- Moderate	5(12.5%)	6(15%)		
- Severe				
Dyspareunia				
- No	2(5%)	1(2.5%)	2.883	0.4099
- Mild	20(50%)	17(42.5%)		
- Moderate	15(37.5%)	14(35%)		
- Severe	3 (7.5%)	8(20%)		

Table 4: Distribution of the samples based on their vulvovaginal candidiasis symptoms at post-intervention(n=80).

Symptoms	After 7 days of intervention		χ2	p-value
	Yogurt Group (n=40) n(%)	Control Group (n=40) n(%)		
Cheesy Vaginal discharge				
- No	32(80%)	6(15%)	35.03	0.0001*
- Mild	4(10%)	20(50%)		
- Moderate	4(10%)	10(25%)		
- Severe	0	4(10%)		
Burning during urination				
- No	37(92.5%)	25(62.5%)	12.82	0.005*
- Mild	3(7.5%)	5(12.5%)		
- Moderate	0	9(22.5%)		
- Severe	0	1(2.5%)		
Vulvovaginal itching				
- No	38(95%)	27(67.5%)	10.19	0.017*
- Mild	1(2.5%)	5(12.5%)		
- Moderate	1(2.5%)	5(12.5%)		
- Severe	0	3(7.5%)		
Vulvo-vaginal erythema with swelling				
- No	38(95%)	31(77.5%)	6.38	0.09
- Mild	2(5%)	4(10%)		
- Moderate	0	3(7.5%)		
- Severe	0	2(5%)		
Dyspareunia				
- No	36(90%)	20(50%)	15.580	0.0014*
- Mild	2(5%)	12(30%)		
- Moderate	2(5%)	7(17.5%)		
- Severe	0	1(2.5%)		

Table 5: Distribution of the time taken for improving VVC symptoms between the two study groups at post-intervention (n=80).

Symptoms	Yogurt Group (n=40) Mean ± SD in days	Control Group (n=40) Mean ± SD in days	t	p-value
Vulvovaginal itching	2.57±0.37	3.88±0.7	11.02	0.001*
Cheesy Vaginal discharge	2.01±0.12	3.03±0.5	16.10	0.001*
Burning during urination	3.37±0.31	4.37±0.36	13.16	0.001*
Vulvo-vaginal erythema with swelling	2.33±0.44	3.76±0.34	15.81	0.001*
Dyspareunia	3.36±0.55	4.77±0.37	13.59	0.001*
Total Time for recovery	6.67±0.7	8.82±0.3	17.85	0.001*

***Highly statistically significant differences at (p ≤ 0.001)**

Discussion

Vulvovaginal candidiasis (VVC) is a common health problem, particularly among women of childbearing age. The current study aimed to evaluate the effect of yogurt containing Lactobacillus acidophilus on vulvovaginal candidiasis symptoms. The study findings support the hypothesis that women utilizing yogurt containing Lactobacillus acidophilus will have better improvement of VVC symptoms compared to those in the control group, which only received standard medical treatment.

The current study revealed participants' demographic characteristics in both the yogurt and control groups. The women's ages ranged from 18 to 45 years, with a mean age of 28.1 ± 5.7 years in the yogurt group and 27.2 ± 5.4 years in the control group. Most participants across both groups were married, had primary or secondary education, were housewives, and resided in rural areas. These characteristics showed no statistically significant differences between the groups, which reflects the homogeneity of the sample. Comparable results were noted by ***Abd-Elmoneen et al. (2020)***, who assessed "the effect of nursing management of women suffering from vulvovaginal candidiasis by using cumin seed extract versus clotrimazole suppository" in Assuit University; found that over half of the women in the study and control groups had preparatory and secondary education, and their mean ages were (8.86 ± 5.750 and 28.92 ± 4.802) respectively. The majority were housewives. Moreover, about three-quarters came from rural areas. Similar findings likely reflect similar cultural and demographic characteristics within the study samples.

Regarding health-related habits, a significant percentage of women, two-thirds in the yogurt group, stated improper genital hygiene practices, including the use of irritant substances and frequent vaginal douching, and half of the women used tight and non-cotton underwear. These findings are in the same line with ***Said et al (2023)***, who evaluated "the effectiveness of nursing intervention protocol on recurrence of vulvovaginal Candidiasis infection associated with pregnancy" in Banha University Hospital, and showed that over than two-thirds of women use vaginal douches and perform sprays, and three-quarters did not wear cotton underwear. This can be explained that poor hygiene practices, frequent use of vaginal douches, and wearing non-cotton clothing can negatively impact the natural balance of microorganisms in the vaginal environment. Such practices may alter local temperature and humidity, reduce ventilation of the genital area, and create conditions conducive to microbial imbalance. These changes can disturb the genital ecosystem, impair its protective function, and increase susceptibility to irritation and discomfort.

Also, the present findings showed that most participants reported lifestyle habits that may contribute to VVC, as over than half of the study participants reported excessive consumption of carbohydrates and spicy foods; above three-quarters of women reported inadequate sleep, less than half of them reported psychological stress, and about two-thirds reported exposure to active or passive smoking. Moreover, the findings of the present study identified several additional health-related behaviors and conditions that may increase the risk of vulvovaginal candidiasis. These include prolonged use of antibiotics and

corticosteroids, represented less than one-fourth of women, presence of chronic illness such as obesity and diabetes mellitus, represented more than one-fourth of women, long-term use of contraceptive methods, represented more than half of women, and frequent sexual intercourse, represented one-fourth of the women. These results align with those of ***Ebrahim et al. (2022)***, who investigated "the effectiveness of baking soda on vaginal yeast infection among adolescent nursing students" in Banha University. Who found that inadequate sleep, frequent consumption of sugary drinks, tight clothing, high intake of spicy foods, and psychological stress were major aggravating factors for VVC. A smaller portion of their sample also reported antibiotic use and diabetes mellitus, further supporting the results of the current study.

Additionally, ***Marschalek et al. (2016),*** who carried out a study on the "risk of vaginal infections at early gestation in patients with diabetic conditions during pregnancy ", emphasized that women diagnosed with gestational diabetes mellitus (GDM) are at significantly higher risk of developing Candida infections, highlighting the link between metabolic disturbances and fungal overgrowth. Similarly, ***Singh and Singh (2018)*** investigated "risk factors for vaginitis in women of childbearing age" in the Faculty of Medicine at Andalas University, and found that less than three-quarters of participants identified using tight clothing as a contributing factor. Furthermore, less than one-fourth reported antibiotic use, and were diabetic—patterns that mirror those observed in the current study and suggest a common risk profile across diverse populations.

Supporting this evidence, by ***Enwuru and Johnson (2022)*** concluded in their analysis of over 45 epidemiological studies published between 2015 and 2021, they identified antibiotic exposure, hormonal contraceptive use, immunosuppressive therapy (including corticosteroids), frequent sexual activity, and vaginal hygiene practices (such as douching) as the most consistent risk factors for VVC across diverse populations. Moreover, data from the Centers for Disease Control and Prevention ***(2021)*** indicate that candidiasis is one of the most common types of vaginitis in the United States, typically presenting with vaginal discharge, pruritus, and irritation. The CDC further identifies that antibiotic use represented half of the women, sexual activity represented one-third of women, and vaginal douching represented about one-fourth as the leading modifiable risk factors for VVC.

These findings underscore the critical role of behavioral and pharmacological factors in the pathogenesis of VVC. The observed variations between the current study and the other study's findings may be partly due to the cultural differences, especially in conservative Arab societies, where women may feel ashamed or hesitant to disclose behaviors related to genital hygiene or sexual practices due to social stigma. Such factors may influence the reliability of self-reported data and complicate efforts to fully understand the behavioral determinants of VVC.

The consistency of findings across multiple studies reinforces the validity of the present results and contributes to a clearer understanding of the common risk factors associated with VVC. The alignment between this study and previous research highlights the universal nature of these risk factors across varying cultural and geographic settings. This consistency supports the implementation of standardized prevention strategies, including health education, behavioral interventions, and improved access to care. Furthermore, it emphasizes the importance of recognizing cultural sensitivities and tailoring interventions to improve the accuracy of health reporting and encourage proactive management of VVC. Overall, the repetition of similar findings across diverse populations not only enhances the reliability of the data but also underscores the global importance of addressing modifiable risk factors in both clinical settings and public health initiatives.

Conversely, the findings of this study contrast with those documented by ***Eraky (2018)***, who examined "the effect of supportive nursing instructions on recurrence of vulvovaginal candidiasis infection during pregnancy" in the antenatal outpatient clinic at El-Manial maternity hospital in Cairo. whose research indicated that most women adhered to appropriate genital hygiene practices. These

included regular changing of undergarments, maintaining dryness after urination, wearing cotton underwear, and avoiding the use of irritants. Additionally, Eraky found no significant association between these health habits and the recurrence of VVC during pregnancy. This discrepancy may be explained by differences in the study samples' characteristics, particularly the inclusion of pregnant women in Eraky's sample. These women may have received health education during antenatal care, were more attentive to their hygiene out of concern for pregnancy complications, or were more motivated to adopt preventive behaviors to avoid adverse outcomes for themselves or their babies. Such factors may have influenced their practices and led to more favorable outcomes regarding infection recurrence.

The current study found that the most prevalent vulvovaginal candidiasis (VVC) symptoms, including vaginal discharge, dysuria, vulvovaginal pruritus, erythema with swelling, and dyspareunia, were similarly reported in both the yogurt-plus-standard-care group and the routine-care-only group at baseline. These findings are in line with ***Abd-Elmoneen et al. (2020)***, who documented that most women above three-quarters had vulvar pruritus, with all participants hundred percent reported white, cottage-cheese-like vaginal discharge. Gynecological examination revealed mixed signs of VVC, such as vaginal redness, swelling, tenderness, and white patches, in two-thirds of the study group and above three-quarters of the clotrimazole group ($P > 0.05$). Similarly, ***Eraky (2018)*** found itching and dyspareunia in the majority of participants, about two-thirds of women had cheesy discharge, less than half of women had discharge with offensive odor, and less than half of women reported recurrent VVC, confirming the consistency of hallmark VVC symptoms across multiple studies.

Recent evidence suggests that the increasing prevalence of fungal vaginitis is directly associated with the widespread and inappropriate utilize of antibiotics and corticosteroids, which disrupt the vaginal microbiota and promote Candida overgrowth ***(Enwuru & Johnson, 2022)***. This disruption manifests in symptoms such as leucorrhea, itching, burning, sleep disturbances, and significant discomfort, which are now increasingly reported among affected women.

Following seven days of yogurt ingestion and intravaginal application, participants in the yogurt group experienced significantly greater symptom reduction compared to the control group ($p < 0.05$ for discharge, dysuria, pruritus, and dyspareunia; erythema and swelling showed a borderline significance at $p = 0.09$). These results align with the findings of ***Darvishi et al. (2015)***, who determined "the effects of vaginal cream, a mixture of yogurt and honey, and compared it with clotrimazole vaginal cream on symptoms of Vulvovaginal candidiasis" in Iran. They demonstrated that a seven-day regimen of yogurt-and-honey vaginal cream significantly alleviated VVC symptoms, supporting its potential as a complementary herbal remedy. Furthermore, ***Ang et al. (2022),*** who studied "Lactobacilli reduce recurrences of vaginal candidiasis in pregnant women", reported that probiotic lactobacilli were effective in reducing VVC recurrence among pregnant women and were also associated with improvements in emotional and social well-being. Probiotics function by enhancing epithelial defense mechanisms, modulating the host immune response, inhibiting the pathogens' migration from the gut to the vagina, and directly inhibiting Candida adhesion to epithelial surfaces ***(Kosgey et al., 2019)***.

Additionally, ***Farr et al. (2021),*** who conducted a "guideline on vulvovaginal candidosis" in Germany, reported that *Lactobacillus rhamnosus*, when administered intravaginally twice daily for one week following miconazole treatment, significantly reduced the recurrence rate of VVC within six months. Lactobacilli have demonstrated antifungal and immune-stimulatory properties in vitro, and also show efficacy in reducing fungal colonization in vivo following antifungal therapy.

However, the current study's results are in contrast to those of ***Buggio et al. (2019)***, who studied "probiotics and vaginal microecology, cautioned against the premature promotion of probiotics for VVC treatment" due to variability across studies in probiotic strains,

administration routes, and treatment durations. Similarly, ***Levina, Ocviyanti, and Adawiyah (2024),*** who studied the "Management of Vulvovaginal Candidiasis in pregnancy", emphasized that before probiotics can be widely recommended for managing VVC, further high-quality research is necessary. Thus, while the current evidence suggests beneficial effects of probiotics in alleviating VVC symptoms, the need for rigorous, standardized clinical trials remains critical.

The current study demonstrated a significantly faster improvement in vulvovaginal candidiasis (VVC) symptoms among participants who received yogurt containing *Lactobacillus acidophilus* in conjunction with routine medical treatment, compared to those who received routine care alone. The average number of days required for symptom relief was significantly lower in the yogurt group than in the control group across all key symptoms: vulvovaginal itching (2.57 ± 0.37 vs. 3.88 ± 0.70), cheesy vaginal discharge (2.01 ± 0.12 vs. 3.03 ± 0.50), burning sensation during urination (3.37 ± 0.31 vs. 4.37 ± 0.36), vulvovaginal redness and edema (2.33 ± 0.44 vs. 3.76 ± 0.34), and dyspareunia (3.36 ± 0.55 vs. 4.77 ± 0.37). Additionally, the total recovery time was significantly shorter in the yogurt group (6.67 ± 0.70 days) compared to the control group (8.82 ± 0.30 days), with all differences reaching high statistical significance ($p < 0.05$).

These findings are incongruent with ***Darvishi et al. (2015)*** who found that over three-quarters of women using a yogurt-and-honey vaginal cream recovered from itching within seven days, versus two-thirds in a clotrimazole group. Supporting this, ***Akinosoglou et al. (2024)*** who examined "the Probiotics in the Management of Vulvovaginal Candidosis", found that vaginal probiotic gel resulted in symptom relief within 10 days for half the participants, with a significant cure rate and no adverse effects. Moreover, ***Fares et al. (2017)*** who assessed "the effect of yogurt intake on relieving symptoms of vulvovaginal candidiasis" in El Fayoum General Hospital, found that after two weeks of ingesting *L. acidophilus* yogurt, over three-quarters of participants in the yogurt group had no cheesy discharge (compared to fewer than one-fourth in the control group), and many reported full reliefs from itching, burning during urination, edema, and dyspareunia.

The accelerated symptom improvement observed in the yogurt group may be attributed to the synergistic effect of probiotics combined with standard antifungal therapy. Probiotics are known to restore microbial balance, inhibit *Candida* adherence, and enhance host immune responses, thus contributing to faster and more effective symptom resolution in VVC.

Conclusion and recommendation

The findings of the current study revealed that utilizing Yogurt containing probiotic bacteria such as Lactobacillus acidophilus, which are beneficial against mucosal candida infections and their beneficial actions by suppress the growth of candida, and thus, yogurt intake can alleviate symptoms of VVC. So, daily yogurt consumption with vaginal application can alleviate symptoms of VVC, which aligns with the study's aim and hypothesis.

Based on the findings of this research, the following are recommended:

(1) Raise awareness through health education programs among women about healthy practices in different maternity and community health care settings to prevent VVC and the importance of utilizing yogurt containing Lactobacillus acidophilus to relieve VVC symptoms and prevent recurrence of infection.

(2) Enhancing training programs for nurses about the benefits of the non-pharmacological modalities, including healthy foods as yogurt, with standard medical care for vaginal candidiasis to achieve positive outcomes.

(3) Further studies are needed on a large sample.

(4) Utilizing new technological methods (different platforms, mobile apps) to raise awareness among high-risk group women on VVC.

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