Comparison of clinical and microbiological features of vulvovaginitis in prepubertal and pubertal girls

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Background/Purpose: Vulvovaginitis is the most common gynecological problem of childhood. The aim of the study was to determine and compare clinical and microbiological features of vulvovaginitis in prepubertal and adolescent girls.

Methods: In this retrospective study, the records of patients who were diagnosed with vulvovaginitis between January 2005 and December 2010 in the pediatric outpatient clinic at Fatih University Hospital were retrieved. Information regarding age, symptoms, history of antibiotic use within 1 month prior to presentation, findings on urinalysis, serum antistreptolysin-O levels, and results of urine/vaginal cultures was collected.

Results: The records of 112 patients were evaluated, 72 of which were prepubertal (64.2%) and 40 were pubertal (35.7%) at the time of diagnosis. Thirty-eight prepubertal patients (52.7%) had a positive result on vaginal culture, the most commonly encountered microorganism being group A beta-hemolytic streptococcus (15.2%). Culture positivity rate in the pubertal group was 47.5% (19 patients), with Candida albicans being the most frequently isolated microorganism (27.5%).

Conclusion: The etiopathogenesis and culture results differ between prepubertal and adolescent girls with vulvovaginitis, which should be taken into consideration in the treatment approach of this disorder.

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Introduction

Childhood vulvovaginitis is one of the most common gynecological conditions encountered in pediatric outpatient clinics, in both prepubertal and pubertal children. Although prepubertal vaginal discharge is almost always pathological, it may be physiological in the postpubertal period. The true incidence of this condition remains unknown. In the prepubertal stage, the vagina is either alkaline or neutral, and vaginal secretions are minimal. Cytological findings of vaginal swabs reveal a few epithelial cells with almost no or very few lactobacilli. With the onset of puberty, lactobacilli quickly multiply, making vaginal fluids more acidic while also contributing to physiological leukorrhea. Several factors facilitate the development of vulvovaginitis in the prepubertal period. Anatomical proximity to the anus, poor hygiene and children’s need to explore their own bodies all increase the likelihood of fecal contamination.

Absence of labial fat pads and pubic hair, the presence of thin and sensitive vulvar skin, as well as atrophic and alkaline vaginal mucosa are also predisposing factors during the prepubertal period. Along with the changes in the flora brought about by hormonal changes in the postpubertal period, cigarette smoking, sexual contact, methods of contraception and poor hygiene may help lay the groundwork for the development of infections.

To the best of our knowledge, very few studies have investigated both prepubertal and pubertal vaginal cultures in the same setting. The aim of this study was to evaluate and compare the clinical and microbiological characteristics of vaginal infections in prepubertal and pubertal children.

Methods

Study population/patient selection

This retrospective study was conducted with approval from the local ethic committee. The medical records of children presenting to the pediatric outpatient clinic at Fatih University between January 2005 and December 2010 were systematically reviewed, and records of those diagnosed with vulvovaginitis were retrieved. Patients with a history of sexual abuse were excluded from the study. Data regarding age, presenting complaint, antibiotic use 1 month prior to presentation, results of urinalysis and urine cultures, anti-streptolysin-A (ASO) levels and the results of vaginal cultures were collected.

Patients were stratified into two groups based on Tanner stage at the time of diagnosis. Those with findings consistent with Tanner stage I were included into the prepubertal group, while those considered Tanner stage ≥2 were placed into the pubertal group. At our hospital, vaginal specimens are obtained by a gynecologist using a sterile newborn suction catheter.

Microbiological examination

Vaginal smears were obtained using multiple sterile swabs, one of which was transferred to a sterile tube containing physiological saline for transport to the laboratory. Some of the material from the swab was transferred on to a slide pending examination for Trichomonas. Material from a second swab was then inoculated onto 5% human blood agar, eosin methylene blue agar (Salubris) and Saboraud Dextrose agar (SDA-Salubris) which were subsequently stored under aerobic conditions. The swab was also inoculated onto chocolate agar, which was incubated at 37°C in a 5% CO2/95% air environment. Material from a third swab (if available) was transferred onto a slide for Gram staining and microscopic examination for the presence of lactobacilli, pathogen bacteria, clue cells and leucocytes. Cultured microorganisms were identified using conventional methods, taking into consideration morphological, physiological and biochemical characteristics as well as Gram staining pattern.

Results

Review of medical records revealed that a diagnosis of vulvovaginitis was made in a total of 112 children; 72 prepubertal (Tanner stage 1) and 40 pubertal (Tanner stage ≥2). None of the patients had a history of sexual abuse. The mean age of prepubertal children was 5.5 ± 2.1 years compared to 16.3 ± 2.3 years in pubertal children (p < 0.001). For both groups, vaginal discharge and itching were the most common presenting complaints (prepubertal group, 70.8%; pubertal group 62.5%). More than half of the children in the prepubertal group (56.9%) had a duration of symptoms of less than 1 week. The clinical and microbiological features of the study population are summarized in Tables 1 and 2, respectively. Vaginal cultures yielded growth in 38 (52.7%) of the prepubertal children; 24 of these were identified as nonpathogenic (33.3%), whereas a pathogenic bacteria were isolated in 14 cases (19.4%). Overall, the most commonly isolated microorganism from vaginal cultures of prepubertal children was group A beta-hemolytic Streptococcus (ABHS) (28.9%), which also made up 78.5% of the pathogenic microorganisms isolated in this group.

From the pubertal group, 19 children (47.5) had a positive growth in the culture from vaginal smears, seven of which were nonpathogenic microorganisms (17.5%) while 12 were pathogenic microorganisms. Candida albicans, which was the most frequently isolated microorganism in the

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Clinical features of the study population.</th>
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<tbody>
<tr>
<td>Feature</td>
<td>Prepubertal n = 72 (%)</td>
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<tr>
<td>Itching and discharge</td>
<td>51 (70.8%)</td>
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<tr>
<td>Dysuria</td>
<td>15 (20.8%)</td>
</tr>
<tr>
<td>Pain</td>
<td>5</td>
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<tr>
<td>Bleeding</td>
<td>—</td>
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<tr>
<td>Loss of appetite</td>
<td>1</td>
</tr>
<tr>
<td>Duration of symptoms</td>
<td></td>
</tr>
<tr>
<td>&lt;1 week</td>
<td>41</td>
</tr>
<tr>
<td>&lt;1 month</td>
<td>15</td>
</tr>
<tr>
<td>&lt;6 months</td>
<td>12</td>
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<tr>
<td>&gt;1 year</td>
<td>4</td>
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</table>
pubertal group (27.5%), made up 91.6% of the pathogenic microorganisms identified in this group.

Out of the 24 prepubertal children with isolated nonpathogenic microorganisms, 20 had slides prepared for examination of vaginal secretions under light microscopy. Leukocytes were observed on nine of these slides (five with *Escherichia coli*, three with coagulase negative staphylococci and one with an *Enterococcus* spp.). From the same group, 14 patients had pathogenic bacteria growth on culture, whereas microscopic examination of prepared slides revealed the presence of leukocytes in 13 cases. The only patient in whom leukocytes were not observed was infected with *Hemophilus influenzae* type b.

Five of the seven pubertal children with nonpathogenic bacteria had slides available for microscopic examination. Leukocytes were only observed in two of these (one with coagulase negative staphylococci and one with ureaplasma). In those with pathogenic bacteria grown on culture, 10 had slides available for examination under a light microscope, nine of which were positive for leukocytes. Leukocytes were not observed in one patient in whom *C albicans* was isolated from a vaginal culture.

Urine cultures were obtained from 58 prepubertal children, in seven of which *E coli* were grown on culture. Only five patients in the postpubertal period had given samples for urine culture, all of which were negative for any growth.

Parasite tests on gaita with the Sellotape slide test method were obtained from 27 prepubertal and eight pubertal patients. *Enterobius vermicularis* were found in two prepubertal patients.

Eighteen prepubertal patients (25%) had a history of antibiotics use for various reasons within 1 month prior to presentation compared to nine patients in the postpubertal group (22.5%).

Out of the 11 patients in whom ABHS was isolated from vaginal cultures, ASO levels were determined in six of them within 6 months prior to presentation. ASO levels were elevated (<200 IU/ml) in four girls.

**Discussion**

The results of this study suggest that the approach to vaginal infections during the prepubertal period should be different from those of patients in the pubertal period. Although infections during these two periods have many similarities, the differences are more prominent. In both groups, vaginal discharge and itching were the most common presenting complaints. While dysuria was the next most common symptom in the prepubertal period, however, it was almost never observed in pubertal children who more frequently complained of pain and bleeding. Similar results have been reported previously. This may be because of the inability of very young children to distinctly articulate their vulvar complaints.

Results of vaginal cultures showed variation in the pre- and postpubertal periods. A positive culture result was obtained in 47.5% of prepubertal children compared to 25% of who had entered puberty. Previous studies have reported positive culture rates of between 31% and 36%. The most frequently isolated pathogenic microorganism in our study population was ABHS (15.2%). Four of the 11 patients with ABHS had elevated serum ASO levels, which may be suggestive of an infection with an upper respiratory origin. Different results have been reported with regards to prepubertal vaginitis. The incidence of ABHS varies from 8–47%. Although earlier studies have demonstrated *Hemophilus influenzae* type b to be the most commonly isolated pathogen, widespread vaccination against this microorganism has resulted in a decrease in incidence in recent years. In a study published in 2003, *Hemophilus influenzae* type b was isolated in 6.8% of 80 children with prepubertal vaginitis. The low rate of 2.7% encountered in our study may be attributed to the fact that the conjugated *Hemophilus influenzae* type b vaccine has been a part of our national vaccination plan since 2006.

Coagulase-negative staphylococci and *E coli* were the most commonly encountered nonpathogenic microorganisms in prepubertal girls (13.8% and 12.5%, respectively). A similar result has been reported by Jaquier et al. Results of vaginal cultures taken from girls the pubertal period were in contrast to those obtained from prepubertal patients. At 27.5%, *C albicans* was the most frequently isolated pathogenic microorganism in this group. Although infection due to *C albicans* is unusual for the prepubertal period, it may occur in association with several risk factors, such as immunocompromisation, malignancy, prematurity, sexual abuse or use of systemic antibiotics. *C albicans* was only encountered in one of our prepubertal patients who received intravenous antibiotics while hospitalized for pneumonia 10 days before presenting to the outpatient clinic with vulvovaginitis. Interestingly, despite the rate of antibiotic use within 1 month of presentation being higher in the prepubertal group compared to the pubertal group, infection with *C albicans* was only detected in one patient, which suggests that hormonal changes are a predisposing factor for infection. Fidel et al. showed that vulvovaginal candidiasis is an estrogen-dependent condition and estrogen is the dominant reproductive hormone that supports and sustains an experimental vaginal *C albicans* infection and reduces the inhibitory activity of epithelial cells against *Candida*. An
Vulvovaginitis in prepubertal and pubertal girls

395

elevated estrogen level during the pubertal period is associated with menstrual irregularities and higher concentrations of glucose in the vaginal epithelium increase susceptibility to infection by *C. albicans*. This condition may be explained why the candida infections are less in prepubertal period.

Diabetes mellitus, antibiotic use, immunosuppression, some methods of contraception, genetic predisposition and behavioral factors are all risk factors for vaginal candidiasis in the pubertal period. In our study population, 22.5% of post-pubertal patients with positive culture results had a history of antibiotic use within 1 month prior to presentation. To date, very few studies have tackled the issue of pubertal vulvovaginitis. In 1996, Tosun et al. managed to isolate *C. albicans* in 21.8% of vaginal cultures. In another study on pubertal children with a positive vaginal culture of 31.5%, *C. albicans* was detected in 23.7% of patients. Although *C. albicans* is the most commonly encountered microorganism responsible for childhood vulvovaginitis, other pathogens such as *Neisseria gonorrhoeae*, *Trichomonas vaginalis* and *Chlamydia trachomatis* have also been reported. Such infections are mainly believed to be sexually transmitted, particularly as a result of sexual abuse. We did not encounter any evidence in support of sexual contact or sexual abuse in our study group. This is supported by culture results.

*Gardnerella vaginalis* is a rare causative agent of pediatric vulvovaginitis and it is not associated with sexual contact or abuse. In our study, only one patient was found to have *G. vaginalis*.

Other known causes of childhood vulvovaginitis include parasites. The most common is *E. vermicularis*. Increased itching of perianal/perineal region at nights, crowded and poor hygiene conditions should make us consider infestation with *E. vermicularis*. A slight irritation and vaginal discharge can also be seen in addition to itching because of the movements of the larvae on the vulva. In our study, we tested for parasites using the gaita with Sel-lotape slide method. Of the 27 prepubertal and eight pubertal patients who presented with itching and discharge, *E. vermicularis* was only determined in two patients in the prepubertal period. Their vaginal cultures were negative. The low incidence of patients with parasites may be explained by the high sociocultural level of patients and the inadequacy of applying only one Sel-lotape slide test for diagnosis.

Chronic vulvitis in childhood is most common due to psoriasis, dermatitis (atopic, allergic, seborrhoeic or irritant) and lichen sclerosis. All of these conditions may present with scaling and erythema of the external vulva with or without vaginitis. Fischer determined that the most common factors of chronic vulvovaginitis in prepubertal patients are psoriasis and dermatitis, and chronic vulvovaginal candidiasis in postpubertal patients. In our study, none of the patients had a diagnosis of psoriasis, any type of dermatitis, lichen sclerosis or chronic vulvovaginal candidiasis. This may be due to low number of patients with a long duration of symptoms and chronic vulvovaginitis in both groups.

Human papilloma virus (HPV) usually leads to infection of the limbs and face, and rarely affects the anogenital region in childhood. Although transmission of HPV is a subject of controversy, it is thought that transmission of perinatal, auto/hetero-inoculation, sexual abuse and indirect transmission via fomites is possible. It has been found that 50–75% of genital warts in children are caused by sexual abuse. There were no cases of genital warts in our study. This result is as expected, because none of the patients included in the study had a history of contact or sexual abuse.

Besides all of these specific etiologies, a specific pathogen is not isolated in 25–75% of girls with vulvovaginitis. This may be due to non-specific irritation resulting from the use of bubble bath, soaps or shampoos; poor hygiene; tight clothing; or fecal contamination. Advice should be given about hygiene measures that can be taken—the avoidance of tight fitting clothing or other irritants such as harsh soaps to the vulva, front to back wiping after using the toilet, sitz baths, and protective ointments.

**Conclusion**

According to our culture results, ABHS is the most common cause of prepubertal vulvovaginitis, whereas *C. albicans* is the most frequent in pubertal children. By establishing the differences between prepubertal and pubertal girls with regards to growth patterns of vaginal cultures, the results of this study highlight the importance of an agent-specific treatment approach to patients with vulvovaginitis to eliminate the irrational use of antibiotics in this setting.

Although not encountered in our study, other factors such as the presence of foreign objects, parasitosis, dermatitis, irritating underwear and bathroom accessories as well as improper genital hygiene should not be overlooked when evaluating patients with childhood vulvovaginitis.

**References**