

Microbiological Findings in Prepubertal Girls with Vulvovaginitis

Nives Šikanić-Dugić, Nives Pustišek, Vlasta Hiršl-Hećej, Amarela Lukić-Grlić

Center of Reproductive Health, Zagreb Children's Hospital, Zagreb, Croatia

Corresponding author:

Nives Šikanić-Dugić, MD, MS
Center of Reproductive Health
Zagreb Children's Hospital
Klaićeva 16
HR-10000 Zagreb
Croatia
Nives.Sikanic.Dugic@kdb.hr

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SUMMARY The aim of the study was to define the most common causes, symptoms and clinical features of vulvovaginitis in prepubertal girls, and to evaluate treatment success depending on the causative agent involved. The study included 115 girls aged 2-8 (mean 4.8) years, presenting with vulvovaginitis to the Outpatient Clinic for Pediatric and Adolescent Gynecology, Zagreb Children's Hospital, between September 2006 and July 2007. Medical history data were obtained from parents. Vaginal samples were collected for microbiological culture by using cotton-tipped swabs moistened with saline. All samples were referred to microbiology laboratory, where standard microbiological diagnostic procedures were performed. Selective and non-selective media were used. Of 115 study patients, 43 (37.4%) had received antibiotic therapy more than one month prior to their visit to the Clinic, mainly for upper respiratory tract infection. The most common presenting symptom was increased vaginal discharge usually noticed on the pants or diaper, found in 26 of 115 (22.6%) patients, followed by vulvar redness in 16 (13.9%), burning in seven (6.1%), itching in the vulvovaginal area in seven (6.1%), soreness in six (5.2%), odor in three (2.6%) patients, and two or more of these symptoms in another 50 (43.5%) patients. Fifty-nine of 115 children had normal clinical finding on gynecologic examination. Among the remaining 56 children, the most common finding was erythema observed in 19, vaginal discharge in ten, and a combination of discharge and erythema in 13 patients. Of 115 study patients, causative agents were isolated from vaginal culture in 38 (33%) cases. Of these, 21 grew group A β hemolytic streptococcus, five patients *Haemophilus influenzae*, three *Escherichia coli*, two *Enterococcus* spp., and one each *Staphylococcus aureus*, *Proteus mirabilis*, and *Streptococcus pneumoniae*. Antibiotic therapy was administered in 31 of these 38 patients, except for those cases where intestinal bacteria and *Staphylococcus aureus* were isolated and topical therapy and hygienic measures were applied alone. Accordingly, vulvovaginitis in girls was most commonly caused by pathogens originating from the patient upper respiratory tract, accompanied by the symptoms of redness and vaginal discharge. In these cases, antibiotic treatment was administered. In the majority of prepubertal girls with either vulvitis or normal genital finding, simple measures to improve hygiene will lead to resolution of all symptoms.

KEY WORDS: prepubertal girls, vulvovaginitis, causative agents

INTRODUCTION

Vulvovaginitis is the most common reason for prepubertal girls to visit a gynecologist office. It

is often a source of great stress not only to the girl but also to the parents, raising concern about

whether the condition would permanently affect the reproductive health of the child later in her life. Vulvitis, vaginitis and vulvovaginitis are the terms often used interchangeably to describe an inflammatory condition of the lower genital tract. It usually occurs as primary vulvitis which may lead to secondary vaginitis. Contrary to adult women, girls rarely present with primary vaginitis, subsequently leading to vulvitis due to irritation caused by vaginal discharge (1). There is a range of most common symptoms in pediatric patients with vulvovaginitis, including vaginal discharge, vulvovaginal itching and burning, soreness, anal redness, and dysuria. Childhood vulvovaginitis has been attributed to a number of predisposing factors, ranging from physiological to pathological ones. Prepubertal vaginal epithelium in the absence of estrogenic stimulation is thin, delicate and atrophic. Due to low estrogen levels and the lack of lactobacilli, vaginal pH is neutral to alkaline and is therefore vulnerable to infection (2). In addition, the child's labia minora are smaller and thin, do not meet in midline and lack the protective effect of labial fat pads and pubic hair. Another recognized cause of vulvovaginitis in prepubertal girls is children's tendency to poor hygiene, particularly inadequate hand washing, and back to front wiping after using the toilet, therefore often contaminating the vagina with intestinal bacteria (3,4). Other possible causes include pathogens from the respiratory, skin and enteric sources, and less frequently the agents of sexually transmitted diseases. The most common respiratory pathogens are β hemolytic streptococcus group A and group B. *Streptococcus pneumoniae* and *Neisseria meningitidis* have also been associated with vulvovaginitis. *Staphylococcus aureus*, *Moraxella catarrhalis* and *Haemophilus (H.) influenzae* can be normal flora, but may also cause active infection (5). *Shigella* is an uncommon cause of vulvovaginitis in prepubertal children and the most common species is *Shigella flexneri* (6). Both *Escherichia coli* and *Yersinia enterocolitica* have been associated with vulvovaginal infection. Pinworms (*Enterobius vermicularis*) are a common cause of vulvovaginitis and should be considered in children whose major symptom is nocturnal perineal pruritus. *Candida albicans* is usually not isolated in prepubertal girls, but it may be found in girls with predisposing factors such as a recent course of antibiotics, diabetes, or wearing diapers. Organisms associated with sexually transmitted diseases also can cause vulvovaginitis; thus, a finding of *Neisseria gonorrhoeae* or *Chlamydia trachomatis* should prompt

careful evaluation for sexual abuse (7). Vaginal foreign bodies should always be considered when a child presents with persistent, foul-smelling or bloody discharge (8,9). Other uncommon causes of vulvovaginitis include lichen sclerosus and atrophicus, vaginal and cervical polyps and tumors, Crohn's disease, etc.

The aim of this study was to assess the incidence of causative agents, symptoms and clinical features, and to evaluate the success of treatment depending on the causative agents involved.

PATIENTS AND METHODS

The study included 115 prepubescent girls aged 2-8 (mean 4.8) years, presenting for the first time for vulvovaginitis to the Outpatient Clinic for Pediatric and Adolescent Gynecology, Zagreb Children's Hospital, during the period from September 2006 to July 2007. The girls that had received a course of antibiotics in the month prior to presentation were excluded from the study. Routine screening for sexually transmitted diseases was not performed unless sexual abuse of the child was suspected; such cases were also excluded from analysis.

Upon obtaining full medical history from the parents, the gynecologist performed detailed examination with the child in supine position, on the examination table or on the parent's lap. Following inspection of external genitalia, labial traction was applied to enable visualization of the hymenal opening. Samples of vaginal secretion were obtained for light microscopy analysis and bacterial cultures. Using a thin cotton-tipped applicator moistened with saline, vaginal swab was collected for microbiological culture. In the youngest children where appropriate view of the vaginal orifice could not be obtained, swabs were taken from the introitus of the vagina. All samples were referred to microbiology laboratory, where standard microbiological diagnostic procedures were performed. For isolation of suspected pathogenic bacteria and yeasts, specimens were cultured on blood agar using the staphylococcus streak technique, chocolate agar, MacConkey agar, Gardnerella selective agar with 5% human blood and Sabouraud agar. Six girls with very severe or extensive inflammatory changes of the skin and perigenital area were referred to a dermatologist for consultation opinion. Before the result of the vaginal swab was available, topical therapy in the form of sitz baths, antifungal creams, or a combined antibiotic, antimycotic and corticosteroid cream was recom-

mended to relieve symptoms. At the follow-up visit on day 7, clinical examination with vaginal culture was performed, and depending on the culture results antibiotic treatment was prescribed according to the isolate antibiotic sensitivity report. After completion of therapy and 10-day post-treatment period, a follow-up swab was obtained as a parameter to evaluate therapeutic efficacy.

RESULTS

The study included 115 prepubertal girls aged 2-8 (mean age 4.8) years, presenting for the first time for vulvovaginitis between September 2006 and July 2007. The majority of subjects (n=101) were referred for examination by their pediatrician, followed in descending order by a nephrologist (n=8), Pediatric Emergency Outpatient Department (n=5), and a dermatologist (n=1). Forty-three (37.4%) of 115 patients had completed antibiotic therapy more than one month before presentation. In this group, 28 (65.1%) subjects had experienced inflammation of the upper respiratory tract and ear, and 15 (34.9%) urinary infection, five of them having taken chemoprophylaxis.

All of the 115 girls in our series presented with some of the symptoms lasting for 1-60 (mean 15.6) days (Table 1). The most common symptom was vaginal discharge seen in 26 (22.6%) patients, followed by genital redness in 16 (13.9%), itching in seven (6.1%), burning in seven (6.1%), soreness of vulvovaginal area in six (5.2%), and odor in three (2.6%) patients. A combination of two symptoms (most frequently redness and discharge, or redness and itching, or discharge and itching) was recorded in 30 (26.1%), and of three or more symptoms in 20 (17.4%) study patients.

Clinical examination of the genitalia yielded normal findings in 59 (51.3%) study patients. Other findings included erythema of vulva in 19 (34%), vaginal discharge in ten (17.8%), combined erythema and discharge in 13 (23.2%), vulvar and

Table 1. Symptoms of vulvovaginitis

Symptom	n	%
Discharge	26	22.6
Redness	16	13.9
Itching	7	6.1
Burning	7	6.1
Soreness	6	5.2
Odor	3	2.6
Two or more symptoms	50	43.5
Total	115	100.0

Table 2. Clinical signs

Clinical sign	n	%
Normal findings	59/115	51.3
Signs	56/115	48.7
Erythema of vulva	19	34.0
Erythema and discharge	13	23.2
Discharge	10	17.8
Erythema of anus and vulva	9	16.1
Excoriation of genital area	5	8.9
Total	115	100.0

perianal erythema in nine (16.1%), and erythema with excoriations in five (8.9%) study patients (Table 2).

Microbiological investigations revealed growth of specific causative organisms in 38 (33.04%) study patients (Table 3). The most frequent pathogens were group A β hemolytic streptococcus, isolated in 21 (55.3%), *H. influenzae* in five (13.2%), group B β hemolytic streptococcus in four (10.5%), *Escherichia coli* in three (7.9%), *Enterococcus* spp. in two (5.3%) patients, and *Streptococcus pneumoniae*, *Staphylococcus aureus*, and *Proteus mirabilis* in one (2.6%) patient each. Normal flora was found in 77 (67%) study patients.

Out of 38 children with bacterial agents isolated from their vaginal cultures, 10 (26.3%) had been treated with antibiotics more than one month before presentation: nine for upper respiratory tract inflammation and one for urinary infection. In the subgroup of patients with bacterial agents grown in their cultures (n=38), the most common symptom was vaginal discharge in 11 (28.9%) patients, followed by discharge and itching in eight (21.1%), redness and discharge in four (10.5%), genital burning in four (10.5%), and redness alone and itching alone in two (5.3%) patients each. A com-

Table 3. Pathogens associated with vulvovaginitis

Pathogen	n	%
Beta hemolytic streptococcus A	21	55.3
<i>Haemophilus influenzae</i>	5	13.2
Beta hemolytic streptococcus B	4	10.5
<i>Escherichia coli</i>	3	7.9
<i>Enterococcus</i> spp.	2	5.3
<i>Proteus mirabilis</i>	1	2.6
<i>Streptococcus pneumoniae</i>	1	2.6
<i>Staphylococcus aureus</i>	1	2.6
Total	38	100.00

bination of three and more symptoms was present in seven (18.4%) cases.

In this subgroup of 38 patients, normal clinical finding was recorded in nine (23.7%) patients, whereas the most common clinical finding in the remaining 29 patients was genital erythema in nine (31.0%) patients, followed by erythema and vaginal discharge in eight (27.6%), erythema of anogenital area in six (20.7%), vaginal discharge alone in three (10.3%), and more severe erythema with excoriations in three (10.3%) patients. All girls with vaginal swabs positive for causative pathogens had negative results on their urine cultures, except for one case of *Proteus mirabilis* infection.

Prior to vaginal culture reports, topical therapy with the use of sitz baths was administered, along with additional antifungal creams due to complaints and a combination of antimycotic and corticosteroid creams for pronounced symptoms in nine and 11 of these 38 children, respectively. Oral antibiotic treatment was initiated in 31 (81.6%) patients according to the antibiotic sensitivity report and they were treated with antibiotics for 10 days. Infections with *E. coli*, *Enterococcus* spp., *Proteus mirabilis* and *Staphylococcus aureus* were only treated topically. All follow-up swabs obtained 10 days post-treatment were negative.

Examination of vaginal secretion under the light microscope revealed leukocytes in 23 (60.5%) of 38 patients, where culture reports revealed a bacterial pathogen. Leukocytes were present in 27 (35.1%) of 77 patients free from pathogen growth.

DISCUSSION

Vulvovaginitis is considered to be the most common reason for prepubertal girls to be referred to gynecologic examination. In the present study, 37.4% of patients had been administered antibiotic therapy more than one month prior to their referral to our Outpatient Clinic. One third of the children with a causative agent cultured from their vaginal swabs had also received antibiotics in the preceding period, mainly for an upper respiratory tract infection. The most frequently isolated pathogens were those causing inflammation of the upper respiratory tract, indicating that therapy was either inappropriately chosen or administered for inadequately long time to resolve primary infection. Unfortunately, these children had no throat or nose swab taken before previous infection, and the pathogens causing inflammation could not be compared. The most common symptoms

at presentation were vaginal discharge and genital redness; however, the majority of girls (43%) had two or more presenting symptoms. In our series, a combination of several discomforts was present more frequently, probably due to secondary irritation of the vulva and the anus caused by vaginal discharge. Comparison of clinical findings revealed half of the children presenting for examination to have completely normal findings. This may have also explained the length of symptom duration before initial examination (time span 1-60 days), during which period the symptoms may resolve spontaneously. In our case series, the most common clinical symptoms included vaginal discharge and erythema, which is consistent with the results reported by Jones (10). More severe changes such as excoriations were found in 10% of patients, prompting consultation with a dermatologist.

A number of studies identified causative organisms considered part of the normal flora in prepubertal girls and those considered pathogenic (11-13). In view of the results of these studies, we decided not to compare the normal vaginal flora with the pathogenic one, but rather to compare microbiological results. In our study, specific infective causes were identified in 38 (33.04%) of 115 children. Stricker *et al.* report on a specific bacterial pathogen found in 29 (36%) of 80 girls and Cox recorded it in 43 (40.5%) of 106 cases (3,14). Group A β hemolytic streptococcus is thought to be the most common pathogenic organism implicated in causing inflammation, and its isolation from more than half of the children investigated in this study is in agreement with the results of other authors (3,15,21). In a multicenter study, Cuadros *et al.* selected 74 girls aged 2 to 12 years with a clinical picture of vulvovaginitis and inflammatory cells on Gram stain, and isolated *Streptococcus pyogenes* and *H. influenzae* in 47 and 12 cases, respectively (16). Joishy *et al.* report on the incidence of group A β hemolytic streptococcus to vary from 8% to 47% and suggest that this infection arises from previous respiratory or skin sources (13). The second most common cause was *H. influenzae* isolated in 13.2% of our cases. On reviewing 106 vaginal and vulvar swabs in a prospective 19-month study, Cox found group A β hemolytic streptococcus to be isolated in 19%, with *H. influenzae* as the second most common pathogen isolated in 11% of cases (14). In our study, 26.3% of children with causative organisms grown on their cultures had been previously treated for upper respiratory tract infection, whereas only one patient had received

treatment for urinary infection. These data appear to confirm again that previous treatment was most likely inappropriate; however, susceptibility to reinfection may also play a role. In one fourth of our patients, clinical examination revealed no abnormalities; the remainder had yellowish purulent vaginal discharge and erythema as the most common symptoms, which is consistent with literature reports (7,17).

In our study, the presence of leukocytes was detected in 60.5% of cases with positive pathogens, but also in 35.1% of girls with negative bacteriological finding. The results of our study suggest that leukocyte finding need not imply the presence of bacterial pathogens. Sugar *et al.* conclude that the presence of leukocytes in discharge smear is sensitive but not specific for bacterial infection (18). Randjelović *et al.* detected the presence of leukocytes in all 78 vulvar specimens with positive pathogens and in only four control group girls with negative bacteriological finding. They conclude that the finding of leukocytes in vulvar smears has a high sensitivity and specificity as an indicator of growth of bacterial pathogens (19).

Depending on the inflammatory agents involved and clinical finding, a course of antibiotic therapy was administered in 31 of 38 cases, most usually penicillin, according to the antibiotic sensitivity report. In cases where fecal bacteria such as *E. coli* and *Enterococcus* spp., which may often be present in the vagina as a result of poor hygiene but without causing inflammation, were identified, the children were given advice about hygiene measures and topical therapy was solely applied. Neither *Candida* nor *Gardnerella vaginalis* was detected in any case, the latter being known to have been isolated from the vagina of asymptomatic virgin girls and hence is not deemed to be diagnostic of sexual abuse (20,21). *Proteus mirabilis*, which is frequently found as part of the normal flora, was treated because of concurrent urinary infection. The presence of *Staphylococcus aureus*, an agent recognized to have a capacity to colonize the vagina from the vulvar skin and often produce asymptomatic infection, gives rise to different approaches, and ours was to apply topical therapy alone. All follow-up swabs upon completion of treatment were negative.

CONCLUSION

Vulvovaginitis in prepubertal girls is most commonly of a nonspecific etiology and responds to simple attention to hygiene by resolution of all clin-

ical signs and symptoms. When clinical symptoms are present, most usually discharge and erythema, microbiological studies should be performed, as the most commonly grown pathogens are the same as those responsible for upper respiratory tract infection requiring appropriate antibiotic treatment based on antibiotic sensitivity report to prevent symptom recurrence.

References

1. Sharma B, Preston J, Greenwood P. Management of vulvovaginitis and vaginal discharge in prepubertal girls. *Rev Gynaecol Pract* 2004;4:111-20.
2. O'Brien TJ. Pediatric vulvovaginitis. *Australas J Dermatol* 1995;36:216-8.
3. Stricker T, Navratil F, Sennhauser FH. Vulvovaginitis in prepubertal girls. *Arch Dis Child* 2003;88:324-6.
4. Kass-Wolff JH, Wilson EE. Pediatric gynecology: assessment strategies and common problems. *Semin Reprod Med* 2003;21:329-38.
5. Muller WJ, Schmitt BD. Group A β -haemolytic streptococcal vulvovaginitis: diagnosis by rapid antigen testing. *Clin Pediatr* 2004;43:179-83.
6. Jasper MJ, Ward MA. Shigella vulvovaginitis in prepubertal child. *Pediatr Emerg Care* 2006;22:585-6.
7. Jaquiere A, Stylianopoulou A, Hogg G, Grover S. Vulvovaginitis: clinical features, aetiology and microbiology of genital tract. *Arch Dis Child* 1999;81:64-7.
8. Merkley K. Vulvovaginitis and vaginal discharge in the pediatric patient. *J Emerg Nurs* 2005;31:400-4.
9. Smith YR, Berman DR, Quint EH. Premenarchal vaginal discharge: findings of procedures to rule out foreign bodies. *J Pediatr Adolesc Gynecol* 2002;13:227-30.
10. Jones R. Childhood vulvovaginitis and vaginal discharge in general practice. *Fam Pract* 1996;13:369-72.
11. Hammerschlag MR, Alpert S, Rosner I, Thurston P, Semine D, McComb D, *et al.* Microbiology of the vagina in children: normal and potentially pathogenic organisms. *Pediatrics* 1978;62:57-62.
12. Vandeven AM, Emans SJ. Vulvovaginitis in the child and adolescent. *Pediatr Rev* 1993;14:141-7.

13. Joishy M, Ashtekar CS, Jain A, Gonsalves R. Do we need to treat vulvovaginitis in prepubertal girls? *BMJ* 2005;330:186-8.
14. Cox RA. *Haemophilus influenzae*: an underrated cause of vulvovaginitis in young girls. *J Clin Pathol* 1997;50:765-8.
15. Hansen MT, Sanchez TV, Eyster K, Hansen KA. *Streptococcus pyogenes* pharyngeal colonisation resulting in recurrent, prepubertal vulvovaginitis. *J Pediatr Adolesc Gynecol* 2007;20:315-7.
16. Cuadros J, Mazon A, Martinez R, Gonzales P, Gil-Setas A, Flores U, *et al.* The aetiology of pediatric inflammatory vulvovaginitis. *Eur J Pediatr* 2004;163:105-7.
17. Kokotos F. Vulvovaginitis. *Pediatr Rev* 2006;27:116-7.
18. Sugar NF, Graham EA. Common gynecologic problems in prepubertal girls. *Pediatr Rev* 2006;27:213-23.
19. Randjelović G, Kocić B, Stojanović M, Mišić M, Mladenović M. Bacteriological findings of the vulvar swab specimens from girls with vulvovaginitis. *Med Biol* 2005;12:159-63.
20. Evans H. Vaginal discharge in the prepubertal child. *Pediatr Case Rev* 2003;3:194-202.
21. Jasper JM. Vulvovaginitis in prepubertal child. *Pediatr Emerg Care* 2009;10:10-3.



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