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Investigation of Common Risk Factors Contributing to Vulvovaginitis in Girls and Development of Preventive Strategies

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Annotation: The development of vulvitis and vulvovaginitis in girls is significantly associated with insufficient hygienic skills within the family, the presence of inflammatory diseases of the genital and urinary systems, as well as with the composition of vaginal microflora and its dependence on immune responses at various stages of sexual development. Based on the clinical and anamnestic results obtained from the main and control groups, the most common risk factors were identified and preventive measures were developed.

Keywords: ultrasound examination, bacterial vaginitis, menarche, epithelial glycogen, reproductive health, estrogen, lactobacilli, vaginal microbiota.

INTRODUCTION: Among the total number of factors negatively affecting reproductive health, stress and nutritional disorders occupy a leading position. Irrational nutrition can directly influence metabolic processes, leading to the development of disturbances in the nutritional system. The development and formation of the reproductive system in girls continues until the age of 16–19 years. During puberty, hormonal changes occur, which induce physiological alterations that lead to menarche. During this period, the vaginal microbiota also undergoes significant changes. This is primarily associated with the proliferation of the multilayered squamous epithelium of the vagina under the stimulation of estrogen and an increase in glycogen production in superficial cells. Under the influence of estrogens, differentiation of the desquamated epithelium occurs, and the keratinization of the vaginal epithelium increases. The subsequent exfoliation of these cells and the release of glycogen, which serves as a substrate for the growth of lactobacilli, take place. From this period onward, the vaginal coccoid flora is replaced by coccoid-bacillary flora, and lactobacilli become the dominant species throughout the reproductive period.

LITERATURE REVIEW: Significant changes also occur in the vaginal microbiota during puberty. The main changes are associated with the active growth of the stratified epithelium under the influence of estrogen and an increase in glycogen content in superficial cells. Estrogens stimulate the development of desquamated epithelium and increase the degree of epithelial keratinization. These cells exfoliate, and the glycogen contained in them serves as a substrate for lactobacilli. As a result, coccal flora is replaced by cocco-bacillary flora, and lactobacilli remain the main microbes during the reproductive period [1,2]. In menstruating adolescent girls, over 40 species of microorganisms have been identified, most of which are similar to those in women of reproductive age, with lactobacilli possessing up to 95% of peroxide activity dominating. Hormonal and microbiological changes affect the vaginal pH, lowering it to 3.8–4.5. In girls with irregular menstruation, the vaginal pH is higher [3]. According to many specialists, microbiota changes during menstruation are primarily associated with endometrial cells and blood discharge. In this situation, the proportion of lactobacilli decreases, the number of anaerobic bacteria increases, and the pH rises to 5.0–6.0. Under these conditions, temporary microbial activation occurs, further altering pH balance. Within 10 days after birth, the level of estrogen in the body significantly decreases, leading to a very soft and thin vaginal epithelium and cessation of glycogen synthesis. The reduction in glycogen results in a decrease in lactobacilli and the amount of organic acids they produce, which, in turn, may raise the vaginal pH to 7.0. By the end of the first month of life, the vaginal epithelium histologically consists only of basal and parabasal cells, lactobacilli are almost absent, and pH may rise to 8.0. According to many researchers, in the neutral

period, the vaginal microbiota of girls represents a stable collection of aerobes, anaerobes, and some intestinal bacteria [5]. Due to estrogen deficiency, glycogen is insufficiently produced in vaginal cells. This leads to a decrease in the number of lactobacilli (Döderlein's bacilli), which form the basis of vaginal flora. Lactobacilli produce lactic acid, which protects the vagina by inhibiting the growth of pathogenic bacteria. When their number decreases, vaginal acidity (pH) shifts toward neutral or alkaline, creating favorable conditions for pathogenic bacteria. Changes in Microflora and the Effect of Intestinal Dysbiosis: The intestinal microbiota plays an important role in the formation of overall immunity in the body. If a child has intestinal dysbiosis, i.e., a decrease in beneficial bacteria and a predominance of harmful bacteria, they can spread to the external genitalia through the anus.This occurs especially in the presence of poor hygiene practices and improper washing. Exogenous (External) Infectious Agents: In cases of vulvovaginitis, pathogenic agents most often identified include streptococci, staphylococci, enterobacteria, Candida species, and others. These bacteria typically originate from the intestines or skin and can enter the vagina. If the child has helminthiasis (e.g., enterobiasis), infection can also occur via Enterobius (pinworms). Development of the Inflammatory Process: When the vaginal epithelium encounters pathogenic agents, an inflammatory response occurs. In this case, blood vessels dilate, exudation (mucosal discharge) increases, leukocytes accumulate, and protective reactions aimed at destroying microbes are activated. As a result, children experience symptoms such as redness, mucosal discharge, itching, and pain. Recurrence and Chronicity: If pathogenic factors in the child (e.g., intestinal dysbiosis, helminthiasis, or allergies) are not eliminated, vulvovaginitis can recur. In chronic cases, inflammation of the vaginal mucosa persists and can have long-term effects on reproductive health [8]. In addition, failure to change hygiene pads in a timely manner may lead to infection development. Blood-soaked pads facilitate rapid microbial growth. To prevent this, it is recommended to change sanitary pads every 3–4 hours during menstruation, i.e., 6–8 times per day. Moreover, to reduce the risk of Candida albicans infection, the use of ventilated, non-moist underwear is advised. To prevent recurrent bacterial vulvovaginitis, several researchers have found it appropriate to administer probiotics and adaptogens orally or intravaginally [9,10].

METHODOLOGY: The study was conducted in 2020–2025 at the Republican Girls' Health Center affiliated with the Tashkent City TashPMI Clinic. Clinical and laboratory changes in girls were observed in practice. In the study design, the main group consisted of 30 girls who developed vulvovaginitis, while the control group included 20 physiologically healthy girls. The research findings were implemented in the activities of the Republican Girls' Health Center affiliated with the Tashkent City TashPMI Clinic.The study aimed to investigate the risk factors leading to the development of vulvovaginitis in girls and to develop an algorithm of preventive measures. Clinical and anamnestic examinations were carried out. Ultrasonography, complete blood count, and urine tests were performed. Vaginal swabs were taken, and bacteriological analysis was conducted to confirm intestinal dysbiosis. A questionnaire was developed, and based on its results, an algorithm of preventive measures was formulated.

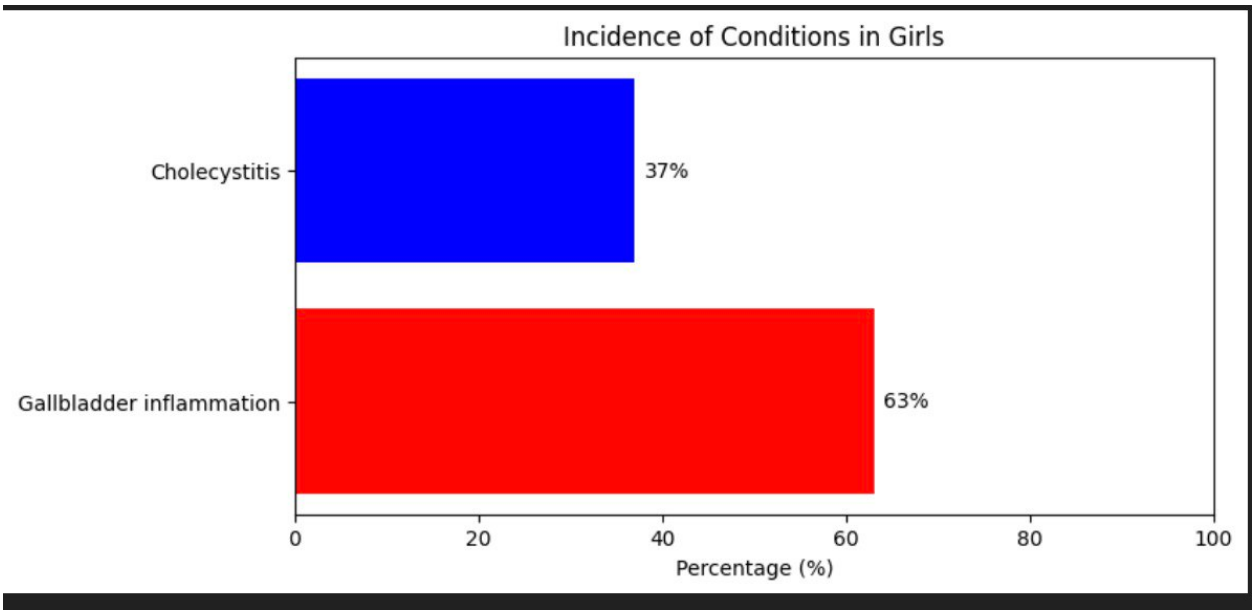
DISCUSSION AND RESULTS: Observations revealed risk factors in adolescent girls: the presence of ENT and gastrointestinal tract diseases; an irrational lifestyle and improper nutrition in 78% of cases; imbalance in daily water intake in 67%; sleep disturbances in 53%; physical inactivity in 48%; and susceptibility to stress in 64%. These were the most common risk factors leading to the development of vulvovaginitis in 83% of the girls observed. During 2020–2025, in addition to the above-mentioned factors, a stepwise algorithm for preventive and therapeutic interventions was developed for these girls. Considering the impact of psychoemotional factors on the complexity of puberty, stepwise preventive and therapeutic interventions based on risk factors leading to disturbances in the nutritional system provided positive results in 78% of cases. This, in turn, prevented disruptions in the reproductive system.

Table 1. Risk factors among girls according to questionnaire results.

The results of the questionnaire	Those who answered yes (%)
Intestinal dysbiosis	78
Oral cavity inflammation	67
Unhealthy lifestyle	67
Insufficient personal hygiene	38
Inadequate water intake (<40мл/кг)	79
Lack of 8-hour sleep (22:00–06:00)	81
Poor-quality nutrition	83

As shown in the results of the questionnaire (Table 1), the identified risk factors were: oral cavity inflammation (67%), unhealthy lifestyle (67%), insufficient personal hygiene (38%), inadequate water intake (<40 ml/kg) (79%), lack of 8-hour sleep (22:00–06:00) (81%), poor-quality nutrition (83%), and intestinal dysbiosis (78%).

Figure 1. Gallbladder diseases detected by ultrasonography in girls with vulvovaginitis.



The performed ultrasound (USG) analyses showed that among girls with vulvovaginitis, 63% had gallbladder inflammation and 37% had cholecystitis. Subsequently, these analyses were compared with clinical and anamnesis survey data to draw conclusions.

CONCLUSION AND RECOMMENDATIONS: During the period of reproductive system development in girls, inflammatory processes in the oral cavity, disorders of the gastrointestinal system, and an improper lifestyle contribute to the development of vulvovaginitis. Girls with risk factors for vulvovaginitis should be examined by a dentist, ENT specialist, pediatrician, and gastroenterologist, as appropriate. In adolescent girls, timely sanitation of chronic inflammatory foci, adherence to a healthy lifestyle (proper and timely nutrition, 8 hours of sleep, regular physical activity, sufficient water intake), and following personal hygiene rules prevent the development of vulvovaginitis. Based on the survey, we were able to identify inflammatory processes in girls and thus provide the opportunity for timely diagnosis of vulvovaginitis.

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