Advances in Healthcare Research, 3(1), 2025. 31 - 44
DOI: https://doi.org/10.60079/ahr.v3i1.388

OPEN ACCESS
ISSN Online: 2985-9808

Advances in Healthcare Research
https://advancesinresearch.id/index.php/AHR

Risk Factors for Vaginal Discharge in Adolescent Girls

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Received: 2024, 09, 18 **Accepted:** 2025, 02, 07
Available online: 2025, 02, 09

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KEYWORDS

Keywords:
Adolescent reproductive health; vaginal discharge; hygiene practices; socio-cultural influences; hormonal imbalance.

Conflict of Interest Statement:
The author(s) declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ABSTRACT

Purpose: This study aims to examine the risk factors contributing to abnormal vaginal discharge in adolescent girls by integrating biological, hygienic, socio-cultural, economic, and psychological determinants. Unlike previous research on hormonal influences, this study offers a comprehensive perspective on how various factors affect adolescent reproductive health.

Research Design and Methodology: This research employs a systematic literature review (SLR) approach to synthesize findings from scholarly articles published after 2018. Relevant studies were retrieved from Elsevier, Emerald, Wiley, and Springer databases. The analysis focuses on identifying dominant biological, behavioral, and environmental factors contributing to vaginal discharge among adolescent girls, along with potential interventions to mitigate health risks.

Findings and Discussion: The results indicate that hormonal fluctuations during puberty influence vaginal microbiota and secretion levels, while poor hygiene practices, lack of reproductive health education, and socio-economic constraints exacerbate infection risks. Cultural stigmas surrounding menstruation and vaginal health further hinder adolescents from seeking timely medical attention. Additionally, stress and mental health issues contribute to hormonal imbalances, increasing susceptibility to abnormal discharge. These findings emphasize the interconnectedness of physiological, behavioral, and environmental factors in adolescent reproductive health.

Implications: This study highlights the importance of comprehensive school reproductive health education, enhanced access to sanitary products, and reduced social stigmas through targeted public health campaigns. Policymakers should prioritize the affordability of sanitary products and ensure access to proper sanitation facilities, particularly in low-income communities. Future research should explore empirical approaches, including qualitative interviews and regional case studies, to further assess the lived experiences of adolescent girls in diverse cultural contexts.

Introduction

Vaginal discharge is a natural and essential physiological process in women, serving as a primary mechanism for maintaining vaginal health by removing bacteria, dead cells, and other unwanted microorganisms (Bin et al., 2022). It helps regulate the vaginal microbiome, ensuring a balanced environment that minimizes the risk of infections. Normal vaginal discharge is typically clear or milky white, varying in consistency depending on hormonal fluctuations throughout the menstrual cycle (Rice et al., 2016). However, deviations in color, odor, volume, or texture can indicate an underlying

health concern, often signaling the presence of infections such as bacterial vaginosis, candidiasis, or sexually transmitted infections (STIs). Among adolescent girls, abnormal vaginal discharge has become an increasingly significant health issue due to the unique physiological and behavioral changes associated with puberty. The surge in estrogen levels during adolescence alters the vaginal pH, creating conditions conducive to the overgrowth of pathogenic microorganisms. Inadequate menstrual hygiene practices, limited access to proper sanitation, and insufficient knowledge about reproductive health further increase the likelihood of developing vaginal infections (Torondel et al., 2018). Despite its prevalence, adolescent girls often struggle to differentiate between normal and pathological vaginal discharge, leading to delayed diagnosis and treatment. Societal stigma, cultural taboos, and misinformation contribute to a reluctance to seek medical attention, exacerbating the risk of complications such as chronic infections and reproductive health issues. The interplay between biological changes, environmental conditions, and behavioral patterns makes vaginal discharge a critical yet understudied aspect of adolescent reproductive health. Addressing this concern requires a comprehensive understanding of the multifactorial nature of vaginal infections and their impact on adolescent well-being.

This issue is particularly pronounced in developing regions where healthcare access is limited, and discussions surrounding reproductive health remain culturally sensitive. In many societies, adolescent girls receive minimal or inadequate education regarding proper genital hygiene, menstrual health, and sexual well-being (Lahme et al., 2018). This lack of knowledge, combined with economic constraints that hinder access to sanitary products, increases their vulnerability to vaginal infections. Additionally, the absence of structured health programs targeting adolescent reproductive health leaves many young girls uninformed about preventive measures and early symptoms of infections (Senderowitz, 1999). While significant research has been conducted on adult women regarding reproductive health issues, there remains a substantial gap in studies focusing specifically on adolescent populations. This knowledge deficiency limits the ability of healthcare providers and policymakers to implement effective interventions tailored to the needs of younger demographics. The long-term implications of untreated vaginal infections, including an increased risk of pelvic inflammatory disease (PID), infertility, and adverse psychological effects, highlight the urgency of addressing this issue at both clinical and public health levels (Xiao et al., 2024). Moreover, previous research has often overlooked the broader socio-economic and psychological factors that contribute to the occurrence of vaginal discharge in adolescent girls. The intersection of personal hygiene habits, cultural norms, economic status, and mental health requires a multidimensional approach to understanding and mitigating the risks associated with abnormal vaginal discharge (Perdomo Sandoval et al., 2024). Bridging this knowledge gap is essential to improving adolescent reproductive health outcomes, reducing infection-related morbidities, and fostering more informed health-seeking behaviors among young girls. The significance of vaginal discharge as a reproductive health concern among adolescent girls has been extensively documented. Studies indicate that they face considerable risks of vaginal discharge and sexually transmitted infections (STIs), with personal hygiene playing a crucial preventive role (Ihsanpuro, 2025). Contributing factors include poor menstrual hygiene, socioeconomic and cultural barriers that limit access to proper sanitary practices, and inadequate reproductive health education (Srivastav et al., 2024). Research estimates that over 50% of women worldwide experience vaginal discharge, with adolescent girls frequently encountering their first episodes during puberty (Ihsanpuro, 2025). Personal hygiene has been widely studied about vaginal discharge, with findings confirming that poor hygiene practices significantly increase the risk of abnormal discharge (Ihsanpuro, 2025). In Indonesia, where the tropical climate exacerbates hygiene-related issues, 90% of adolescent girls are at risk (Eduwan, 2022). Global studies further suggest that up to 75% of women experience vaginal discharge, with most cases emerging during adolescence (Lanis et al., 2020). This review examines the biological, environmental, and psychological factors contributing to vaginal discharge. While research has established the importance of hygiene, there is a need to explore how socio-cultural norms, educational access, and psychological stressors interact with biological predispositions to exacerbate this issue. Addressing these aspects will provide a more comprehensive understanding of the challenges associated with adolescent reproductive health.

Despite extensive research on vaginal discharge and its associated risk factors, significant gaps remain in both empirical and theoretical understandings of the issue, particularly in the context of adolescent girls. Previous studies have predominantly focused on the biological and hygienic determinants of vaginal discharge, emphasizing hormonal changes and inadequate personal hygiene as primary risk factors (Ihsanpuro, 2025). While these studies provide valuable insights, they often overlook the broader socio-cultural, economic, and psychological dimensions that contribute to the prevalence of vaginal discharge among adolescent girls. Research has established that poor menstrual hygiene management and cultural barriers significantly impact adolescent reproductive health (Srivastav et al., 2024), yet little attention has been given to how these factors interact with psychosocial stressors such as stigma, mental health challenges, and misinformation. Furthermore, while previous findings highlight the tropical climate as a significant environmental factor influencing vaginal infections in Indonesia (Eduwan, 2022), research on how regional variations in climate, sanitation, and healthcare infrastructure affect adolescent girls remains limited. From a theoretical perspective, existing literature fails to integrate a multidisciplinary approach in assessing vaginal discharge risk factors. Most studies remain segmented, focusing on medical aspects or behavioral components without exploring their interconnectivity. Moreover, there is a lack of research investigating the long-term consequences of recurrent vaginal infections on adolescent reproductive health. Addressing these gaps is crucial for developing holistic and evidence-based interventions tailored to teenage girls, ultimately improving reproductive health education and healthcare accessibility.

This study seeks to bridge the existing gaps in research on vaginal discharge among adolescent girls by utilizing a systematic literature review (SLR) to synthesize findings from various disciplines. Unlike previous research that predominantly focuses on biological and hygienic determinants, this study takes a more comprehensive approach by integrating socio-cultural, economic, and psychological factors that may contribute to the prevalence of vaginal discharge. While prior studies have established personal hygiene as a key determinant (Ihsanpuro, 2025; Milushkina et al., 2023), little attention has been given to the intersection of mental health, cultural stigmas, and limited access to reproductive health education in exacerbating the condition. By systematically analyzing existing literature, this study aims to highlight the complex interplay between biological processes, lifestyle choices, and external social factors that influence vaginal discharge in adolescent girls. To achieve this, the research is guided by the following key question: What are the primary risk factors contributing to vaginal discharge in teenage girls? From this central inquiry, the study will explore (1) the dominant biological, environmental, and psychological factors linked to vaginal discharge, (2) the extent to which these factors interact and amplify risk, and (3) possible public health interventions and educational strategies to mitigate the issue. By addressing these aspects, the study will offer valuable insights for healthcare professionals, policymakers, and educators, contributing to a more targeted and multidisciplinary approach to adolescent reproductive health.

Literature Review

Vaginal Discharge

Vaginal discharge is a natural physiological process essential for maintaining female reproductive health. It consists of secretions from the cervix and vaginal walls, playing a crucial role in cleansing the vagina by removing dead cells and bacteria while maintaining an optimal pH balance (Girigoswami et al., 2024). Dorjey et al. (2022) emphasize that vaginal discharge functions as a protective mechanism against infections, with Lactobacillus acting as a dominant beneficial bacterium that inhibits pathogen growth. The composition and volume of vaginal discharge fluctuate depending on hormonal changes throughout puberty, the menstrual cycle, pregnancy, and external factors (Mulu et al., 2015). These variations are essential in differentiating between normal and abnormal vaginal discharge, as disruptions in this balance can lead to microbial overgrowth and subsequent infections. Alterations in color, odor, and texture often characterize abnormal vaginal discharge. Sobel (2016) highlights that an imbalance in vaginal flora may result in excessive or discolored discharge, commonly linked to infections such as bacterial vaginosis, candidiasis, or sexually transmitted diseases. Changes in discharge composition, including a yellow or green hue accompanied by a foul

odor and itching, are significant indicators of pathological conditions. In adolescent girls, hormonal fluctuations further heighten the risk of microbial imbalances, exacerbating symptoms of abnormal discharge. Additionally, poor personal hygiene, improper use of feminine hygiene products, and inadequate reproductive health education increase susceptibility to infection (Umami et al., 2022). Understanding these distinctions between normal and abnormal discharge is essential for early detection and effective management of reproductive health issues, thereby reducing the risk of long-term complications.

Abnormal vaginal discharge significantly affects women's overall well-being, encompassing both physical and psychological health concerns. Lemly & Gupta (2020) highlight that untreated abnormal discharge often leads to infections that ascend to the upper reproductive tract, increasing susceptibility to pelvic inflammatory disease (PID). This condition, if left unmanaged, can result in long-term complications such as infertility and adverse pregnancy outcomes. Furthermore, Adolfsson et al. (2017) emphasize that recurring vaginal infections are commonly associated with bacterial vaginosis and candidiasis, both of which disrupt the natural vaginal microbiota, leading to persistent symptoms and discomfort. The continuous presence of abnormal discharge often worsens the mental health of affected individuals, as recurrent infections contribute to anxiety and diminished self-esteem. Beyond its physical repercussions, Werner et al. (2024) points out that abnormal vaginal discharge imposes a significant social burden, mainly due to its association with stigmatization and embarrassment. Women experiencing persistent symptoms often withdraw from social and professional settings, fearing judgment or misunderstanding regarding their condition. Starrs et al. (2018) further assert that limited reproductive health education exacerbates these issues, preventing early diagnosis and intervention. Without proper awareness, many women engage in harmful self-treatment practices, such as vaginal douching or excessive use of antimicrobial products, which further disrupt vaginal flora. Addressing these challenges requires comprehensive education, improved access to healthcare, and proactive screening programs, ensuring that affected individuals receive timely and effective interventions while minimizing social stigma and psychological distress.

Biological and Hormonal Changes

Puberty is a critical phase in adolescent female reproductive development, marked by significant hormonal fluctuations that impact vaginal health. Hillard (2013) explains that the increase in estrogen and progesterone levels plays a key role in regulating cervical mucus production and vaginal discharge composition. Estrogen primarily stimulates cervical gland secretions, ensuring adequate vaginal moisture and maintaining a protective barrier against pathogens. Meanwhile, progesterone contributes to the thickening of vaginal mucosa, influencing the consistency and volume of vaginal discharge throughout the menstrual cycle (Collins et al., 2022). These hormonal changes also alter the vaginal pH balance, which is crucial for supporting Lactobacillus, the dominant beneficial bacteria in the vaginal microbiome (Miller et al., 2016). However, sudden hormonal shifts can disrupt this ecosystem, increasing the risk of infections such as bacterial vaginosis and candidiasis. Understanding the distinction between physiological and pathological vaginal discharge is essential in adolescent reproductive health management. During puberty, physiological discharge naturally increases due to heightened estrogen activity, contributing to a clear or milky-white appearance (Lowdermilk et al., 2019). In contrast, pathological discharge results from microbial imbalances, often accompanied by unusual odor, color changes, and discomfort. The menstrual cycle further influences vaginal discharge, with pre-ovulatory estrogen dominance producing a more elastic and watery consistency, while post-ovulatory progesterone dominance leads to thicker discharge. Baka et al. (2022) further emphasize that extreme hormonal fluctuations, particularly in early puberty, may exacerbate vaginal discomfort, creating a predisposition for infections. Addressing these concerns through proper reproductive health education and preventive strategies is crucial in ensuring optimal adolescent well-being.

External factors play a significant role in exacerbating abnormal vaginal discharge among adolescent girls, particularly those related to stress, diet, and hygiene practices. Hanifah et al. (2023) emphasize that psychological stress significantly impacts hormonal regulation, particularly the balance of estrogen and progesterone, which directly influences vaginal discharge production. Elevated cortisol levels due to chronic stress can disrupt this hormonal equilibrium, leading to

increased and prolonged episodes of abnormal discharge. Additionally, Anjarsari & Sari (2020) highlight that adolescents experiencing high-stress levels often report irregular menstrual cycles, further contributing to fluctuations in vaginal secretions and increasing susceptibility to infections. Nutritional deficiencies are also linked to disruptions in vaginal microbiota balance. Kas (2023) found that malnutrition negatively affects hormonal production, leading to pH imbalances that create a favorable environment for pathogenic microorganisms. Excessive sugar consumption, according to Darma et al. (2017), promotes the overgrowth of Candida, one of the primary causes of pathological vaginal discharge. Beyond dietary habits, improper genital hygiene remains a critical risk factor. Hanifah et al. (2023) note that the use of chemical-laden feminine hygiene products and tight, non-breathable underwear increases moisture retention, creating conditions conducive to bacterial and fungal growth. Addressing these concerns requires comprehensive reproductive health education, particularly emphasizing the importance of stress management, balanced nutrition, and appropriate hygiene practices in preventing abnormal vaginal discharge and maintaining adolescent reproductive health.

Personal Hygiene and Sanitation Practices

Personal hygiene is a crucial determinant of adolescent reproductive health, particularly in preventing abnormal vaginal discharge. Chen et al. (2017) emphasize that maintaining proper menstrual hygiene significantly reduces the risk of bacterial accumulation, which can otherwise lead to excessive vaginal discharge and infections. Adolescent girls who fail to change sanitary products regularly or lack access to clean water and adequate sanitation facilities are more vulnerable to infections due to prolonged moisture retention in the genital area (Sihite et al., 2017). Additionally, the use of scented soaps, antiseptics, and vaginal douching disrupts the natural vaginal microbiota by eliminating Lactobacillus, a beneficial bacterium responsible for maintaining an optimal vaginal pH. This disruption increases susceptibility to conditions such as bacterial vaginosis and candidiasis, which are primary causes of abnormal discharge. Liang et al. (2019) highlight that inadequate reproductive health education exacerbates poor hygiene practices, leading to a higher incidence of recurrent infections among adolescents. Many girls are unaware that synthetic undergarments and tight clothing contribute to excessive moisture retention and reduced air circulation, creating an ideal environment for pathogenic growth (Seyfarth & Elsner, 2010). As estrogen levels surge during puberty, vaginal secretions naturally increase, making hygiene management even more critical (Putri & Sari, 2018). Without proper educational interventions, misconceptions regarding feminine hygiene persist, further amplifying the risks of vaginal infections and discomfort (Kaur et al., 2018). Addressing these gaps through early hygiene education programs and increased access to reproductive health resources is essential for reducing the prevalence of abnormal vaginal discharge among adolescent girls.

External factors play a crucial role in exacerbating abnormal vaginal discharge among adolescent girls, particularly those related to socioeconomic conditions, hygiene practices, and lifestyle choices. Cohn & Blumberg (2020) emphasize that inadequate access to clean water and proper sanitation facilities significantly increases the risk of infections, particularly in low-income communities where menstrual hygiene management is often neglected. Without proper hygiene education, many adolescents resort to using unsanitary menstrual products, further exacerbating the risk of vaginal infections. The choice of clothing also plays a fundamental role in maintaining vaginal health. Simpson et al. (2004) found that adolescent girls who frequently wear synthetic or tight-fitting garments experience higher moisture retention, creating an environment conducive to bacterial and fungal overgrowth. This is particularly concerning during puberty when elevated estrogen levels naturally increase vaginal secretions, making hygiene maintenance even more essential (Chen et al., 2017). Stress has been identified as a contributing factor to hormonal imbalances, leading to increased vaginal discharge due to excessive cortisol production, which interferes with estrogen and progesterone regulation (Amabebe & Anumba, 2018). Addressing these challenges requires comprehensive reproductive health education, improved sanitation access, and greater awareness of the impact of hygiene practices, clothing choices, and stress management on adolescent reproductive well-being. By implementing these preventive measures, teenage girls can significantly reduce their risk of developing abnormal vaginal discharge and its associated health complications.

Socio-Environmental and Cultural Factors

Limited access to reproductive health education significantly contributes to the high prevalence of abnormal vaginal discharge among adolescent girls. Majeed et al. (2022) emphasize that inadequate menstrual hygiene education in schools leaves many adolescents unaware of the differences between normal and abnormal vaginal discharge, resulting in poor hygiene practices. Without comprehensive knowledge, many young girls fail to change their sanitary products regularly or resort to unsuitable hygiene methods, such as using commercial vaginal cleansers with harsh chemicals, which disrupt the vaginal microbiota and increase the risk of infection (Koto, 2018). Cultural and social stigmas surrounding menstruation and vaginal health prevent open discussions, making adolescents hesitant to seek medical advice. Chandra-Mouli & Patel (2017) highlight that in many communities, menstruation is perceived as a private and taboo subject, leading to misinformation and reliance on traditional remedies that may worsen vaginal health. This reluctance extends to medical consultations, where societal norms discourage adolescents from discussing reproductive health concerns (Sommer et al., 2015). Additionally, a lack of specialized healthcare providers in rural and underserved areas further exacerbates this issue, leaving many young girls without access to evidence-based guidance on vaginal health management. Addressing these challenges requires comprehensive reproductive health programs, which incorporate accurate menstrual hygiene education, dismantle harmful stigmas, and provide adolescents with the necessary resources to maintain proper vaginal hygiene and prevent infections.

Economic factors play a crucial role in influencing menstrual hygiene practices and the prevalence of abnormal vaginal discharge among adolescent girls. Majeed et al. (2022) emphasize that inadequate access to sanitary products forces many girls to reuse unsanitary materials, such as cloth or tissue, increasing the likelihood of bacterial and fungal infections. This problem is exacerbated in low-income communities, where limited access to clean water and proper sanitation significantly impacts menstrual hygiene. Akanzum & Pienaah (2023) found that adolescent girls in rural Ghana face significant hygiene challenges due to inadequate sanitation infrastructure, which exposes them to higher risks of reproductive infections. Cultural stigmas and economic constraints often prevent adolescent girls from seeking medical assistance, leading to untreated infections that worsen over time. Mohammed & Larsen-Reindorf (2020) highlight that in many developing countries, menstruation remains a taboo subject, leaving girls uninformed about proper hygiene practices. As a result, many rely on traditional remedies that may further disrupt the vaginal microbiome. Addressing these challenges requires structural interventions, such as government-subsidized sanitary products and educational programs in schools. Sommer et al. (2015) advocate for policy reforms that promote access to menstrual hygiene resources, ensuring that economic barriers do not compromise adolescent reproductive health. Through comprehensive menstrual health education and improved sanitation infrastructure, teenage girls can reduce their risk of abnormal vaginal discharge and related infections, ultimately improving their overall well-being.

Research Design and Methodology

Study Design

This study adopts a qualitative systematic literature review (SLR) approach to examine and synthesize existing research on the risk factors for vaginal discharge in adolescent girls. A systematic review method is chosen to ensure a structured, transparent, and comprehensive analysis of available literature, allowing for a deeper understanding of the biological, socio-environmental, cultural, and economic determinants of abnormal vaginal discharge. This approach enables the identification of key themes, knowledge gaps, and patterns in prior research, ultimately providing insights for future studies and public health interventions.

Sample Population and Research Subjects

The research subjects consist of peer-reviewed journal articles, academic books, and conference proceedings published between 2018 and 2024, sourced from reputable scientific databases such as Elsevier, Springer, Wiley, and Emerald. The inclusion criteria focus on studies that examine biological, hormonal, hygiene-related, socio-environmental, and economic risk factors associated

with vaginal discharge in adolescent girls. Studies discussing general reproductive health but lacking direct relevance to vaginal discharge or adolescent girls were excluded to maintain the specificity and rigor of the review.

Data Collection Techniques and Instrument Development

Relevant literature was collected using a keyword-based search strategy to ensure that only studies related to the research topic were included. Keywords such as "risk factors for vaginal discharge," "vaginal health in adolescent girls," "hormonal influences on vaginal discharge," "socioeconomic barriers in reproductive health," and "menstrual hygiene and vaginal infections" were used to filter relevant studies. The selection process involved multiple screening stages, where abstracts and full texts were reviewed to confirm their alignment with the research objectives. Only empirical and theoretical studies providing substantial insights into vaginal discharge risk factors were included in the final dataset.

Data Analysis Techniques

A thematic analysis approach was applied to identify patterns, key themes, and emerging trends within the collected literature. Studies were categorized based on their focus areas, including hormonal changes, hygiene practices, socio-cultural influences, and economic constraints affecting vaginal health. The extracted findings were then analyzed to establish interconnections among different risk factors, assess recurring issues and gaps in the literature, and develop a comprehensive framework that highlights the primary determinants of vaginal discharge in adolescent girls. The results of this analysis provide a foundation for discussing implications for public health interventions and future research directions.

Findings and Discussion

Findings

Adolescent girls undergo significant hormonal changes during puberty, primarily due to the increased production of estrogen and progesterone. Estrogen plays a crucial role in stimulating the maturation of the vaginal epithelium, increasing vaginal secretions, and promoting the growth of beneficial microbiota such as Lactobacillus, which helps maintain an acidic vaginal pH to prevent infections (Collins et al., 2022). However, fluctuations in hormone levels can also create an environment conducive to bacterial overgrowth, leading to infections like bacterial vaginosis (Baka et al., 2022). The imbalance in microbiota composition, combined with changes in pH, increases the likelihood of abnormal vaginal discharge characterized by unpleasant odor, itching, and irritation (Bin et al., 2022). Hormonal fluctuations during the menstrual cycle impact the composition and volume of vaginal discharge. Before ovulation, estrogen dominance leads to a thin, watery discharge that facilitates sperm motility. In contrast, after ovulation, progesterone causes a thicker mucus secretion, creating an environment that reduces bacterial colonization. However, excessive hormonal imbalances—exacerbated by conditions like polycystic ovary syndrome (PCOS) or endocrine disorders—can alter vaginal flora, making adolescent girls more susceptible to infections (Dorjey et al., 2022). Understanding these biological processes is crucial for distinguishing between physiological and pathological discharge, enabling healthcare providers and educators to guide adolescent girls in recognizing symptoms that require medical attention. Early education on reproductive health and the effects of hormonal shifts can empower young women to manage their vaginal health proactively.

Personal hygiene and lifestyle choices play a pivotal role in preventing abnormal vaginal discharge among adolescent girls. Poor menstrual hygiene, including infrequent changes of sanitary products, the use of synthetic undergarments, or wearing tight clothing, contributes to an environment that fosters bacterial and fungal growth (Kaur et al., 2018). Studies have found that improper hygiene practices, such as vaginal douching and the use of perfumed hygiene products, disrupt the vaginal microbiome, stripping away beneficial bacteria and altering pH balance, thereby increasing the risk of infections (Chen et al., 2017). Furthermore, girls in low-income communities who reuse menstrual products due to financial constraints are at greater risk of developing reproductive tract infections, including bacterial vaginosis and candidiasis (Akanzum & Pienaah, 2023). Education on proper

menstrual hygiene management is essential in reducing the prevalence of vaginal infections among adolescents. Schools and community programs should emphasize the importance of washing hands before and after handling sanitary products, using clean water to cleanse the genital area, and avoiding using products that contain harsh chemicals. In addition, ensuring access to menstrual hygiene products and adequate sanitation facilities can significantly improve adolescent girls' reproductive health outcomes (Hanifah et al., 2023). Preventive measures focusing on lifestyle and hygiene should be integrated into sexual health education programs, promoting sustainable and safe practices to mitigate the risks associated with poor hygiene.

Cultural norms and economic barriers significantly impact adolescent girls' ability to manage their vaginal health effectively. In many societies, menstruation and reproductive health remain taboo subjects, leading to misinformation and reluctance to seek medical help (Mohammed & Larsen-Reindorf, 2020). This stigma can result in adolescent girls feeling embarrassed or fearful about discussing vaginal health concerns, ultimately delaying the diagnosis and treatment of infections (Lahme et al., 2018). Additionally, some cultural beliefs discourage the use of menstrual hygiene products, compelling young girls to rely on unhygienic alternatives such as rags or leaves, further increasing the risk of infections (Torondel et al., 2018). Economic constraints exacerbate these challenges by limiting access to proper sanitation facilities and hygiene products. Adolescent girls from low-income families often cannot afford sanitary pads and instead use cloth, which, when improperly cleaned, becomes a breeding ground for bacteria and fungi (Cohn & Blumberg, 2020). Research indicates that in developing regions, the absence of proper water and sanitation facilities in schools leads to frequent absences among menstruating girls, negatively affecting their academic performance and overall well-being (Akanzum & Pienaah, 2023). Addressing these socioeconomic disparities requires systemic interventions, including government-subsidized sanitary products, improved sanitation infrastructure, and educational initiatives that promote open discussions about reproductive health.

Psychological well-being is closely linked to vaginal health, with studies suggesting that stress and mental health disorders contribute to abnormal vaginal discharge (Amabebe & Anumba, 2018). Adolescents experiencing chronic stress exhibit elevated cortisol levels, which can disrupt hormone regulation, thereby increasing susceptibility to infections (Anjarsari & Sari, 2020). Additionally, stress-induced hormonal imbalances have been associated with irregular menstrual cycles, which in turn affect vaginal discharge consistency and pH balance (Kas, 2023). Anxiety and depression may also impact personal hygiene practices. Adolescents struggling with mental health issues often neglect self-care routines, including regular bathing and menstrual hygiene management, which further predisposes them to infections (Girigoswami et al., 2024). Studies show that young women experiencing body image concerns or self-esteem issues may feel discomfort discussing reproductive health, leading to untreated vaginal health issues (Dorjey et al., 2022). Mental health support and counseling should be incorporated into reproductive health programs to ensure adolescents understand the connection between emotional well-being and physical health. Schools and community centers can implement stress management workshops and mindfulness practices to help young girls develop coping mechanisms that support overall well-being.

The risk factors for abnormal vaginal discharge are interconnected, requiring a holistic approach to prevention and intervention. Biological changes during puberty predispose adolescent girls to infections, which are further exacerbated by poor hygiene practices, socioeconomic constraints, and cultural stigmas. For example, inadequate access to menstrual hygiene products due to financial difficulties increases the likelihood of using unhygienic alternatives. At the same time, cultural taboos prevent young girls from seeking medical advice for reproductive health concerns (Mohammed & Larsen-Reindorf, 2020). Stress and mental health conditions also contribute to hormonal imbalances, creating an environment conducive to infections (Amabebe & Anumba, 2018). Addressing these multifaceted issues requires coordinated efforts between healthcare providers, educators, policymakers, and community leaders. Comprehensive reproductive health education should be implemented in schools to ensure that adolescents are well-informed about menstrual hygiene, risk factors for infection, and proper self-care practices (Hanifah et al., 2023). Public health initiatives must prioritize increasing access to affordable sanitary products and enhancing facilities in schools

and communities, particularly in low-income areas. Social campaigns aimed at destigmatizing menstruation and reproductive health discussions are also necessary to create a supportive environment where adolescent girls feel empowered to seek medical attention when needed. A multidisciplinary approach that integrates biological, social, and economic factors will be key to improving vaginal health outcomes for adolescent girls worldwide.

Discussion

The findings of this study indicate that abnormal vaginal discharge among adolescent girls is a complex issue influenced by multiple factors, including biological, personal hygiene, socio-cultural, economic, and psychological determinants. From a biological perspective, hormonal fluctuations during puberty play a critical role in the increased production of vaginal secretions. The surge in estrogen levels stimulates the production of vaginal fluids, which function as a natural defense mechanism to maintain a healthy vaginal microbiota and prevent pathogenic microorganism overgrowth. However, hormonal imbalances caused by chronic stress, poor nutrition, or underlying medical conditions—such as polycystic ovary syndrome (PCOS)—can lead to excessive vaginal discharge and a heightened risk of infections, particularly bacterial vaginosis and vulvovaginal candidiasis. In addition, fluctuations in vaginal pH due to hormonal shifts impact microbial colonization, creating an environment conducive to bacterial or fungal overgrowth. This study underscores that physiological changes during puberty extend beyond increased vaginal discharge and can significantly contribute to reproductive health complications if microbiota homeostasis is disrupted. Furthermore, factors such as immune system development and individual variations in hormone levels influence the degree of susceptibility to infections. Therefore, early intervention through health education and awareness programs is crucial to equipping adolescent girls with the knowledge and practices necessary to maintain vaginal health and prevent abnormal discharge.

Beyond biological influences, personal hygiene practices have emerged as a crucial determinant of vaginal health among adolescent girls. The study highlights a widespread lack of knowledge regarding proper hygiene behaviors, including regular sanitary pad changes, the selection of breathable cotton underwear, and the avoidance of chemical-based feminine hygiene products that disrupt vaginal pH balance. Many adolescents engage in harmful hygiene practices, such as vaginal douching, the frequent use of scented soaps, and prolonged wearing of tight clothing, all of which create a moisture-rich environment that facilitates the proliferation of pathogenic microorganisms. These behaviors disrupt the vaginal microbiota by depleting beneficial Lactobacillus bacteria, which play a key role in maintaining optimal vaginal pH and preventing infections. Additionally, the absence of structured reproductive health education in schools and families exacerbates this issue, leaving many adolescents without reliable sources of information on proper hygiene and infection prevention. This knowledge gap highlights the need for targeted educational initiatives that promote safe hygiene practices and empower adolescents to make informed decisions about their reproductive health. Integrating comprehensive reproductive health curricula into school systems and fostering parental engagement in adolescent health discussions are crucial strategies for addressing this gap and ensuring that young girls adopt appropriate hygiene behaviors.

From a socio-cultural perspective, this study reveals that stigma and misinformation regarding menstruation and vaginal discharge remain significant barriers to adolescent girls' access to medical assistance for reproductive health concerns. In many societies, discussions related to menstrual and vaginal health are considered taboo, resulting in widespread misconceptions and reluctance to address these issues openly. As a consequence, adolescent girls experiencing abnormal vaginal discharge often hesitate to seek medical guidance, fearing judgment or embarrassment. Restrictive cultural norms that discourage open conversations about reproductive health further contribute to lower awareness levels, leaving many young girls unaware of the warning signs of abnormal discharge that require medical intervention. Additionally, the lack of communication between parents and adolescents on reproductive health matters exacerbates the problem, leading to delayed treatment and increased reliance on ineffective traditional remedies. To combat these cultural barriers, targeted public health campaigns and community-based education initiatives are essential in breaking down stigmas and normalizing discussions on reproductive health. Digital platforms, peer education

programs, and school-based interventions can serve as practical tools in fostering an environment where adolescents feel comfortable seeking accurate information and medical support regarding their reproductive health concerns.

Economic disparities also play a significant role in determining adolescent girls' vulnerability to abnormal vaginal discharge. The study reveals that adolescents from low-income households often lack access to essential sanitation products, including high-quality sanitary pads, proper underwear, and clean restroom facilities in schools and residential areas. Financial constraints force some adolescents to reuse unsanitary menstrual products, significantly increasing their risk of vaginal infections due to bacterial and fungal proliferation. In addition, poor sanitation infrastructure—particularly in schools with inadequate access to clean water and functional restroom facilities—further exacerbates the problem by exposing adolescent girls to increased infection risks. Adolescents from economically disadvantaged backgrounds also face reduced healthcare accessibility, limiting their ability to receive timely medical attention for reproductive health issues. The intersection of financial hardship and limited health resources underscores the need for policy interventions to improve adolescent reproductive health outcomes. Governments and non-governmental organizations must implement initiatives that provide subsidized or free sanitary products and improve school sanitation infrastructure. Expanding access to affordable healthcare services and integrating reproductive health programs into community-based health centers can help bridge the gap in healthcare access and ensure that economically disadvantaged adolescents receive the support they need to maintain their reproductive health.

Finally, the study emphasizes the vital role of mental health in maintaining hormonal balance and mitigating the risk of abnormal vaginal discharge. Chronic stress is a known disruptor of hormonal equilibrium, leading to elevated cortisol levels that interfere with estrogen and progesterone balance, thereby triggering excessive vaginal discharge and an increased susceptibility to infections. Adolescents experiencing high-stress levels are also more likely to engage in unhealthy dietary habits, and exhibit weakened immune responses, further exacerbating their vulnerability to reproductive health complications. Additionally, adolescents with unmanaged stress and anxiety may neglect their hygiene, unintentionally increasing their risk of infections. Implementing effective stress management strategies—such as physical exercise, mindfulness practices, and fostering strong social support networks—can help mitigate these risks. Schools, parents, and healthcare providers must work collaboratively to promote mental health awareness and ensure that adolescents have access to psychological support services. Integrating stress management techniques into reproductive health education programs will empower adolescents with the tools they need to maintain both their mental and reproductive health, ultimately reducing the prevalence of abnormal vaginal discharge. By addressing the interplay between mental health and reproductive health, this study underscores the importance of a holistic approach in mitigating risk factors associated with vaginal discharge among adolescent girls.

Compared to previous studies, the findings of this research reinforce existing literature on the relationship between personal hygiene practices and the prevalence of abnormal vaginal discharge. The study conducted by Chen et al. (2017) emphasized that the use of inappropriate feminine hygiene products can lead to disruptions in vaginal pH balance, increasing the risk of infections. This aligns with the current study's findings, which highlight the role of chemical-based hygiene products in altering the vaginal microbiome and predisposing adolescent girls to bacterial and fungal infections. Similarly, research by Torondel et al. (2018) established that adolescents with inadequate access to proper sanitation facilities are more vulnerable to genital infections. This conclusion is strongly supported by this study's findings on the lack of sanitation infrastructure in schools and its negative impact on reproductive health. Despite these consistencies, many previous studies primarily focused on biological determinants of abnormal vaginal discharge, often attributing it solely to hormonal changes during puberty. While hormonal fluctuations remain a significant contributing factor, this study provides a broader perspective by incorporating socio-economic and psychological variables into the analysis. The findings suggest that beyond biological mechanisms, economic limitations and mental health conditions—such as chronic stress—play a crucial role in exacerbating vaginal discharge abnormalities. This study thus expands the current body of knowledge by emphasizing the need for a

multidisciplinary approach that considers the complex interactions between biological, social, and economic factors in addressing adolescent reproductive health issues.

The practical implications of this study emphasize the critical need to enhance access to reproductive health education and provide more affordable sanitary products for adolescent girls. Educational institutions play a pivotal role in implementing comprehensive programs that equip adolescents with essential knowledge of personal hygiene and vaginal infection prevention. By incorporating structured health education into school curricula, young girls can develop a clear understanding of the distinction between physiological and pathological vaginal discharge and learn the necessary steps to take when experiencing abnormal discharge. Additionally, improving access to credible and science-based health information through digital platforms and community outreach programs can further empower adolescents to make informed decisions regarding their reproductive health. From a policy perspective, government intervention is necessary to ensure the availability of high-quality sanitary products at affordable prices, particularly for adolescents from low-income families. Many young girls face financial constraints that prevent them from purchasing essential hygiene products, increasing their risk of infections due to unsanitary practices. Addressing this issue requires subsidized distribution of hygiene products, school-based menstrual health interventions, and community-driven awareness campaigns. Improving sanitation infrastructure in schools and public spaces reduces hygiene-related infections. Ensuring access to clean water, adequate toilet facilities, and proper waste disposal systems can significantly mitigate the risk of diseases associated with poor menstrual hygiene. By adopting an integrated, evidence-based approach, these efforts can help minimize the prevalence of abnormal vaginal discharge among adolescent girls and enable them to maintain optimal reproductive health.

Conclusion

This study has provided a comprehensive analysis of the risk factors contributing to abnormal vaginal discharge among adolescent girls. By examining biological, hygienic, socio-cultural, economic, and psychological influences, the research highlights the multifaceted nature of this reproductive health issue. The findings suggest that hormonal changes during puberty significantly impact vaginal secretions, while poor hygiene practices, lack of reproductive health education, and socio-economic constraints exacerbate the risks of infection. Additionally, stigma and cultural taboos surrounding menstruation and vaginal health prevent many adolescents from seeking medical intervention. The study underscores the need for a more integrated approach that considers the interplay of physiological processes, personal habits, and external environmental factors in addressing abnormal vaginal discharge among adolescent girls.

The significance of this research lies in its holistic perspective, which bridges the gap between biological determinants and broader socio-environmental and psychological factors. Unlike prior studies that primarily focused on hormonal changes and microbial imbalances, this study highlights the intersection of hygiene, social stigma, economic barriers, and mental health as critical factors influencing reproductive well-being. These insights contribute to both scientific knowledge and practical policymaking. From a practical standpoint, educational institutions should implement comprehensive reproductive health programs, while policymakers should ensure equitable access to high-quality sanitary products and adequate hygiene facilities. Moreover, healthcare practitioners must adopt a multidisciplinary approach to addressing vaginal health issues, combining medical interventions with awareness programs to encourage early detection and proper management of abnormal vaginal discharge.

This study has limitations that should be acknowledged. First, relying on existing literature may introduce potential biases related to data interpretation, as variations in study methodologies and sample populations can affect the generalizability of findings. Second, the study does not explore regional or cultural differences in depth, which could influence hygiene practices and perceptions of vaginal health. Future research should adopt empirical methods, including qualitative interviews and longitudinal studies, to further investigate the lived experiences of adolescent girls in diverse socio-cultural contexts. Additionally, there is a need for further exploration of psychological factors, particularly the role of stress and mental health interventions in mitigating the risks associated with

abnormal vaginal discharge. Future research can develop more targeted and evidence-based interventions to improve adolescent reproductive health by addressing these gaps.

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