

Factors Associated with Vulvovaginal Candidiasis Among Female Students in Gauteng, South Africa: Implications for Universal Health Coverage

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Abstract

Background: Vulvovaginal candidiasis (VVC) is one of the most common fungal infections affecting women of reproductive age worldwide and is associated with considerable discomfort, recurrent infections and reduced quality of life. Young women, particularly university students, may be at increased risk due to behavioural, environmental and lifestyle factors. This study examined risk factors for VVC among female students attending a Gauteng province university health clinic.

Method: A cross-sectional analytical study was conducted among 90 female students, predominantly aged 18–22 years, who presented with symptoms of VVC at a university health clinic in Gauteng, South Africa. Data on clinical, behavioural and demographic characteristics were collected using a structured questionnaire and analysed using descriptive and inferential statistical methods.

Results: The findings indicated a high prevalence of recurrent VVC, especially among sexually active single women, with hygiene practices and recent partner changes being significant factors.

Conclusion: These findings provide evidence to inform targeted reproductive health education and improved access to youth-friendly sexual and reproductive health services, which are essential components of strategies aimed at advancing Universal Health Coverage.

Keywords: epidemiology; health behaviours; reproductive health; university students; vulvovaginal candidiasis



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Introduction

Vulvovaginal candidiasis (VVC) is one of the most common fungal infections affecting women of reproductive age worldwide. It is estimated that up to 75% of women experience at least one episode of VVC during their lifetime, while approximately 5–8% develop recurrent infections (Denning et al. 2018; Nair et al. 2022). The condition is characterised by symptoms such as vaginal itching, irritation, abnormal discharge and discomfort, which can significantly affect women's sexual health, daily functioning, and overall quality of life (Seyed et al. 2023). Despite being a common condition, recurrent VVC continues to present a considerable clinical and public health challenge due to its impact on healthcare use and well-being.

In many low- and middle-income countries, the burden of VVC may be higher due to factors such as limited access to healthcare services, inadequate hygiene conditions and low levels of reproductive health awareness. Studies conducted in several African and Asian countries have reported prevalence rates ranging from 30% to 40% among women of reproductive age (Amona et al. 2020; Kilonzo et al. 2021; Nwankwo et al. 2022). Behavioural and clinical factors such as antibiotic use, hormonal changes, sexual activity and poor genital hygiene practices have also been identified as important contributors to the development and recurrence of VVC (Kiasat et al. 2019; Satora et al. 2023).

Young women attending universities may be particularly vulnerable to VVC due to lifestyle and behavioural factors, including changes in sexual practices, communal living environments, shared hygiene facilities and limited knowledge about reproductive health conditions. In South Africa, studies have indicated that VVC remains underdiagnosed and undertreated among university students despite the availability of campus health services (Molefe et al. 2022). In addition, stigma and misconceptions surrounding sexual and reproductive health conditions may delay healthcare-seeking behaviour among young women, thereby increasing the risk of recurrent infections (Dlamini et al. 2020).

The Health Belief Model (HBM) was used in this study as a theoretical framework to understand behavioural factors influencing healthcare-seeking practices and preventive behaviours related to VVC. The model explains how individuals' perceptions of susceptibility, severity, benefits of treatment, and barriers to care influence their health-related decisions (Rosenstock 1974; Alyafei and Easton-Carr 2024). In the context of VVC, the HBM helps explain how symptom recognition, perceived stigma and knowledge about reproductive health services may influence whether young women seek timely medical care.

Globally, the Sustainable Development Goal 3 (Good Health and Well-being) advocates for Universal Health Coverage (UHC), which aims to ensure that all individuals have access to essential health services without experiencing financial hardship (World Health Organization or WHO 2010). Sexual and reproductive health services, including

the prevention and treatment of common reproductive tract infections such as VVC, are essential components of UHC frameworks (WHO 2021). Improving access to youth-friendly sexual and reproductive health services has been identified as an important strategy for strengthening health systems and reducing preventable reproductive health conditions among young women (Denning et al. 2018; Satora et al. 2023).

Despite the global burden of VVC, there is limited research examining the behavioural and clinical factors associated with the condition among university students in South Africa. University environments present unique risks, including communal living conditions, shared hygiene facilities and diverse sexual behaviours.

Within the broader context of UHC, access to sexual and reproductive health services, including the prevention and treatment of reproductive tract infections, is essential for improving women's health outcomes (WHO 2021). Understanding the epidemiological and behavioural factors associated with VVC among young women is important for informing targeted health education and prevention strategies. This study aimed to examine factors associated with VVC among female students attending a university health clinic in Gauteng province, South Africa.

Methods

Study Design

A quantitative cross-sectional study design was employed. Data were analysed using SPSS version 28. Descriptive statistics summarised participant characteristics, while chi-square tests were conducted to examine associations between categorical variables and VVC symptoms. The tests were conducted, but the χ^2 values were inadvertently omitted.

Study Setting

The study was conducted at a university health clinic in Gauteng province, South Africa. The clinic serves a large student population and represents a crucial frontline access point for sexual and reproductive health services. Given its high volume of VVC cases and documented challenges related to treatment availability, the clinic serves as a pertinent setting for studying the barriers to effective care within the context of UHC implementation.

Study Population and Sampling

The participants included registered female students who attended the university health clinic, were able to understand and complete the self-administered questionnaire (e.g., in English or a pre-translated local language) and provided written informed consent. A non-probability convenience sampling technique was used to recruit female students attending the university health clinic during the study period. A total of 220 students were approached and invited to participate in the study. Of these, 90 met the inclusion

criteria (reported symptoms consistent with VVC and completed the questionnaire fully) and were included in the final analysis.

Data Collection

Data were collected using a structured, self-administered questionnaire developed by the researcher aligned with the study objectives. The questionnaire consisted of five sections: (1) socio-demographic characteristics, (2) behavioural and hygiene practices, (3) clinical and reproductive history, (4) symptoms and history of VVC and (5) healthcare-seeking behaviours and access to treatment services at the university health clinic. Items included in the questionnaire relating to symptom recognition, perceived seriousness of symptoms, barriers to seeking care, and healthcare-seeking behaviours were conceptually aligned with constructs of the HBM, including perceived susceptibility, perceived severity, perceived barriers and cues to action.

The questionnaire was developed based on existing literature on VVC and reproductive health behaviours. Content validity was established through expert review by two public health researchers and a clinician experienced in sexual and reproductive health, who evaluated the relevance and clarity of the items. The instrument was then pilot tested among 10 female students attending a similar university health clinic to assess clarity and comprehensibility. Minor revisions were made based on feedback obtained during the pilot testing.

VVC status was determined based on clinical assessment conducted at the university health clinic and documented in the patient records. Diagnosis was supported by characteristic symptoms reported during consultation, including vaginal itching, irritation and cottage cheese-like vaginal discharge. These clinical presentations are widely recognised indicators used in the diagnosis of VVC in primary healthcare settings.

Data Analysis

Data were analysed using SPSS version 28. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were computed for continuous variables.

Bivariate analysis using the chi-square test was conducted to assess associations between selected behavioural variables and reported symptoms of VVC. A statistically significant association was observed between sexual activity and vaginal itching ($p = 0.019$). However, no statistically significant associations were found between hygiene practices and the occurrence of VVC symptoms among participants ($p > 0.05$).

Ethical Considerations

Ethical clearance was granted by the Sefako Makgatho Health Sciences University Research Ethics Committee (SMUREC/H/258/2020:PG), and permission was obtained

from the Director and Manager of the HC to conduct the research at the site. Confidentiality and privacy were maintained by assigning numbers to the questionnaires. Written informed consent was obtained from all participants prior to data collection. Participants were provided with an information sheet explaining the purpose of the study, procedures involved and their right to withdraw from the study at any time without penalty. Data were stored securely in password-protected devices, with no access by third parties.

Results

The demographic and clinical characteristics of participants are presented in Table 1 below.

Table 1: Socio-demographic characteristics of the study participants

Characteristic	Frequency (n)	Percentage (%)
Age (18–22 years)	54	60
Marital status (unmarried)	86	95
Educational level (undergraduate)	80	88.9
School of Medicine	30	33.3
School of Health Care Sciences	26	28.9
Not pregnant at time of study	84	93.3

Socio-demographic Characteristics of Participants

The socio-demographic characteristics of the study participants are presented in Table 1. A total of 90 female students diagnosed with VVC participated in the study. Most participants (60%) were aged 18–22 years, reflecting the predominant age group attending the university health clinic. Most participants were unmarried (95.6%) and undergraduate students (88.9%).

Participants were primarily from the School of Medicine (33.3%) and the School of Health Care Sciences (28.9%). Most participants (93.3%) reported that they were not pregnant at the time of the study.

Table 2: Behavioural, hygiene and medication-related characteristics of participants

Characteristic	Frequency (n)	Percentage (%)
Sexually active	83	92.2
Changed sexual partners in past six months	56	62.2
Use of soap on genital area	25	27.8
Shared showers	39	43.3
Use of antibiotics for at least one week	34	37.8
Recent use of antibiotics	37	41.1
Use of oral contraceptives	30	33.3
Use of anti-inflammatory drugs	29	32.2

Behavioural, Hygiene and Medication-related Characteristics

The behavioural, hygiene and medication-related characteristics of participants are presented in Table 2. Most participants (92.2%) reported being sexually active, while 62.2% indicated that they had changed sexual partners within the previous six months. Regarding hygiene practices, 27.8% of participants reported using soap on the genital area, while 43.3% indicated that they shared showers with others.

In terms of medication use, 37.8% of participants reported using antibiotics for at least one week and 41.1% indicated recent antibiotic use. Additionally, 33.3% of participants reported the use of oral contraceptives, while 32.2% reported using anti-inflammatory medications.

Table 3: Clinical presentation and recurrence of VVC among participants

Characteristic	Frequency (n)	Percentage (%)
Vaginal itching	79	87.8
Cottage cheese-like vaginal discharge	65	72.2
Pain during VVC episodes	65	72.2
VVC episodes once a year	26	28.9
VVC episodes four or more times a year	20	22.2
Moderate to severe pain during VVC episodes	57	72.2

Clinical Presentation and Recurrence of VVC

Table 3 presents the clinical presentation and recurrence patterns of VVC among participants. The most commonly reported symptoms were vaginal itching (87.8%) and cottage cheese-like vaginal discharge (72.2%). In addition, 72.2% of participants reported experiencing pain during VVC episodes, with most describing the pain as moderate in severity.

Recurrent VVC, defined as four or more episodes annually, was reported by 22.2% of participants in this study.

Table 4: Cross-tabulation of behavioural factors and VVC symptoms

Behavioural variable	Symptom observed	p-value	Interpretation
Sexual activity	Vaginal itching	0.019	Statistically significant association
Use of soap on genital area	VVC symptoms	>0.05	Not statistically significant
Sharing showers	VVC symptoms	>0.05	Not statistically significant
Oral contraceptive use	VVC symptoms	>0.05	Not statistically significant
Anti-inflammatory drug use	VVC symptoms	>0.05	Not statistically significant

Factors Associated with VVC

Bivariate analysis using the chi-square test was conducted to examine associations between selected behavioural factors and symptoms of VVC among participants (Table 4). The analysis revealed a statistically significant association between sexual activity

and the occurrence of vaginal itching ($p = 0.019$). However, no statistically significant associations were observed between hygiene practices, such as sharing showers or using soap on the genital area, and VVC symptoms ($p > 0.05$). Similarly, the use of oral contraceptives and anti-inflammatory medications was not significantly associated with VVC among the participants.

Discussion

This study examined behavioural and clinical factors associated with VVC among female university students attending a health clinic in Gauteng province. The findings indicate a high frequency of symptoms, particularly vaginal itching and abnormal discharge, as well as notable recurrence patterns among participants. Behavioural factors such as sexual activity and recent partner changes were also common among participants, suggesting potential behavioural influences on the occurrence of VVC in this population.

This study adds to our understanding of the epidemiology and risk factors of VVC among young women aged 18–22 (Kiasat et al. 2019; Osman Mohamed et al. 2022). This age group appears to be particularly susceptible due to hormonal changes, sexual behaviours and lifestyle choices that promote *Candida* colonisation and infection (Satora et al. 2023). The high prevalence of symptoms such as vaginal itching and abnormal discharge observed in this study is consistent with previous studies that identified these symptoms as the most common clinical manifestations of VVC among women of reproductive age (Bhosale et al. 2025; Pereira et al. 2021). These symptoms are widely recognised indicators used in the clinical diagnosis of VVC. Fungal infections, including VVC, are still very common worldwide, particularly in environments with limited resources (Amona et al. 2020a). A major clinical challenge is recurrent VVC; in this study, 22.2% of participants had recurrences (Osman Mohamed et al. 2022). Hormonal effects on biofilm formation and pathogen resilience have been highlighted in laboratory studies that have investigated the mechanisms underlying persistence and recurrence (Gonçalves et al. 2020; Pereira et al. 2021). MALDI-TOF mass spectrometry is a key diagnostic advancement that has improved species identification, allowing for more focused and efficient treatment approaches (Pereira et al. 2021).

Treating recurrent VVC necessitates an all-encompassing strategy that prioritises precise diagnosis, efficient antifungal treatment and behavioural interventions. Itching, discharge and irritation are examples of clinical manifestations that must be recognised for timely diagnosis and treatment. Infection risk and the emergence of resistance can be considerably decreased by educational programmes that encourage good genital hygiene and prudent antibiotic use.

Due to the multifactorial nature of VVC, it is essential to integrate technological advancements with behavioural strategies. The burden on young women attending

universities can be effectively reduced by individualised treatment plans supported by precise diagnosis and patient education. The HBM supports education and barrier reduction to improve reproductive health outcomes. Improving early diagnosis, health education and access to treatment services can contribute to better reproductive health outcomes among young women.

The HBM, which provides insights into the behavioural factors influencing healthcare-seeking and self-management practices for VVC, can be used to better understand the study's findings. The high frequency of symptoms like itching and abnormal vaginal discharge indicates that many students are aware of their vulnerability to VVC, but the relatively low rate of healthcare use suggests that perceived barriers may limit timely healthcare-seeking behaviour. Many students recognise symptoms but face barriers such as stigma and limited knowledge (Alyafei and Easton-Carr 2024). Perceived severity influences whether students seek care. Students may differ in their perceptions of the severity of VVC. Some people might underestimate the health effects, particularly in recurrent cases where complications and ongoing discomfort may arise. Improving perceived severity through focused health education may encourage early intervention and more proactive management.

University health clinics serve as critical entry points for young women seeking reproductive healthcare and play an important role in providing timely diagnosis and treatment of conditions such as VVC. Strengthening these services aligns with broader UHC goals by improving access to essential sexual and reproductive health services.

Recommendations

Strengthen Health Education Programmes and Awareness Campaigns: University administrators should prioritise thorough health education initiatives that educate female students about VVC, its risk factors, preventive measures and the significance of timely treatment. Using student health clubs and peer educators can boost participation and information sharing.

Enhance Access to Healthcare Services: Campus clinics should have easily accessible, affordable and confidential healthcare services. This entails training healthcare professionals on how to accurately diagnose and manage VVC as well as fostering a friendly atmosphere that lessens the stigma attached to sexual health issues.

Implement Preventive and Behavioural Interventions: Through workshops, posters and online resources, community leaders and health management should encourage safe sexual behaviour, responsible antibiotic use and proper genital hygiene. Customised interventions can dispel myths and lower obstacles to seeking medical attention.

Boost Peer Networks and Support Systems: Create peer support groups that promote candid discussion of reproductive health concerns, lessen stigma and inspire students to

get treatment as soon as possible. Peer-led programmes can create a supportive atmosphere that encourages healthier habits.

Use Technology and Media: To raise awareness and encourage quick action, use social media campaigns, mobile health (mHealth) apps and SMS reminders to inform students about VVC symptoms, prevention and available medical services.

Policy Development and Implementation: To guarantee all students receive comprehensive care, university administration should create explicit policies that support reproductive health rights, confidentiality and non-discrimination. These policies should be in line with national health coverage goals.

Work Together with Health Authorities: To lessen the burden of VVC and other reproductive health issues, universities should collaborate with regional health departments and non-governmental organisations.

Limitations

Despite the valuable insights provided, this study has several limitations.

Sample Size and Generalisability: The study's findings may not be as applicable to larger populations, such as women of different ages or those who are not in academic settings, because it was limited to a small and specific group of female university students.

Cross-Sectional Design: The cross-sectional design limits the ability to establish causal links between identified risk factors and the occurrence of VVC.

Self-Reported Information: The accuracy of the data may be affected by recall bias or social desirability bias due to the reliance on self-reported symptoms, behaviours and medical history.

Limited Diagnostic Techniques: The study primarily relied on clinical reports and patient histories.

Potential Selection Bias: The results could be skewed if participants who decided to reply had more severe symptoms or were more aware of their health.

Furthermore, the study included only participants presenting with symptoms consistent with VVC at the clinic and did not include a comparison group of asymptomatic individuals, which limits the ability to determine causal relationships between risk factors and infection.

Conclusion

VVC remains a common reproductive health concern among young women attending university health clinics. The findings of this study highlight the high frequency of symptoms, recurrent infections and behavioural factors such as sexual activity, antibiotic use and hygiene practices among affected students. These results underscore the importance of targeted reproductive health education and timely access to diagnosis and treatment services within university healthcare settings. Improving awareness of symptoms, promoting appropriate hygiene practices and encouraging early healthcare-seeking behaviour may help reduce the burden of VVC among university students. Strengthening student-friendly sexual and reproductive health services within campus clinics can also contribute to improved management and prevention of recurrent infections. Such initiatives may support broader public health efforts aimed at improving access to reproductive health services and advancing equitable healthcare delivery.

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Competing interests

The authors declare that no competing interests exist.

Authors' Contributions

EM conceptualised the study and conducted the data collection and analysis. JML supervised the research process. MBR and JML contributed to manuscript drafting, validation, data curation and final review.

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Data Availability

The data cannot be made available to the public due to the confidentiality agreement.

Disclaimer

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