

Epidemiological and clinical profile of vulvovaginitis at the University Clinics of Kisangani City (Tshopo Province), Democratic Republic of the Congo

Dawili, D. K.¹, Djolu, R. D.², Ndaba, M. M.³, Moleke, R. A.¹, Masengo, C. A.^{4,5}, Mawunu, M.⁶, Komanda, E. L.⁷, & Ngbolua, K. N.^{5,8}

¹Medical Biology Section, Higher Institute of Medical Techniques of Karawa, Kinshasa, Democratic Republic of the Congo

²Department of Environment, Faculty of Science and Technology, Gbado-Lite University, Gbado-Lite, Democratic Republic of the Congo

³Faculty of Social, Administrative, and Political Sciences, Gbado-Lite University, Gbado-Lite, Democratic Republic of the Congo

⁴Medical Biology Section, Higher Institute of Medical Techniques, Kinshasa, Democratic Republic of the Congo

⁵Center for Research in Pharmacopoeia and Traditional Medicine (CRPMT, ISTM/Kinshasa), Democratic Republic of the Congo

⁶Polytechnic Institute of Kimpa Vita University, Uíge, Republic of Angola

⁷Faculty of Medicine, University of Kisangani, Kisangani, Democratic Republic of the Congo

⁸Department of Biology, Faculty of Science and Technology, University of Kinshasa, Democratic Republic of the Congo

ARTICLE INFO

Received: 13 April 2024

Accepted: 26 May 2024

Published: 09 June 2024

Keywords:

Vulvovaginitis, gynecological infections, causative agents, Women's health, Democratic Republic of the Congo

Peer-Review: Externally peer-reviewed

© 2024 The Authors.

Re-use permitted under CC BY-NC 4.0
No commercial re-use or duplication.

Correspondence to:

Prof. Koto-Te-Nyiwa Ngbolua
jpngbolua@unikin.ac.cd

To cite:

Dawili, D. K., Djolu, R. D., Ndaba, M. M., Moleke, R. A., Masengo, C. A., Mawunu, M., Komanda, E. L., & Ngbolua, K. N. (2024). Epidemiological and Clinical profile of vulvovaginitis at the University Clinics of Kisangani City (Tshopo Province), Democratic Republic of the Congo. *Orapuh Journal*, 5(3), e1124. <https://dx.doi.org/10.4314/orapj.v5i3.24>

ISSN: 2644-3740

Published by *Orapuh, Inc.* (info@orapuh.org)

Editor-in-Chief: Prof. V. E. Adamu
Engelhardt School of Global Health & Bioethics,
Euclid University (Pôle Universitaire Euclide)

ABSTRACT

Introduction

Vulvovaginitis is an inflammation that affects both the vulva (the external part of the female genital organs) and the vagina. It can be caused by various factors such as bacterial, fungal, or viral infections, allergic or irritative reactions, or hormonal imbalances. Common symptoms include itching, burning, redness, pain, and abnormal vaginal discharge.

Purpose

This study aimed to examine the epidemiological and clinical approach to vulvovaginitis at the University Clinics of Kisangani during the years 2012-2014.

Methods

The study included a total of 1,966 patients admitted to the Gynaecology and Obstetrics Department during the study period. Data on age, marital status, education level, occupation, and residential area were collected. Information on antecedent infections, presenting symptoms, and causative agents was also gathered. Statistical analysis was performed to determine the prevalence and distribution of vulvovaginitis cases.

Results

Out of the total patients, 298 (15.2%) were diagnosed with vulvovaginitis. Most cases were aged between 20-24 years (29.9%), followed by 15-19 years (25.8%), and 25-29 years (17.1%). Most cases were married (55.4%) and had secondary education (46%). Housewives accounted for the highest proportion of cases (44.63%). Makiso had the highest number of cases (54%), followed by Mangobo (25.2%). The most common antecedent infection was vaginal candidiasis (46.3%), and the most common presenting symptom was abnormal genital discharge (37.2%). *Candida albicans* was the most common causative agent (46.64%), followed by *Neisseria gonorrhoeae* (26.84%) and *Trichomonas vaginalis* (22.48%). Other agents were *Chlamydia trachomatis* (1.67%), *Haemophilus ducreyi* (1%), human papillomavirus (HPV), and herpes simplex virus (HSV) (0.67% each).

Conclusion

Vulvovaginitis is a common condition at the University Clinics of Kisangani, affecting a significant proportion of women. The findings highlight the need for further research and education on the prevention and management of vulvovaginitis in this population.

INTRODUCTION

According to Labama (2005), Makanjuola et al. (2018); Yassin et al. (2020), and Yasin et al. (2021), vulvovaginitis is an infectious and inflammatory disease of the lower female genital tract that plays a crucial role in gynecology. It can be caused by various factors, including infectious agents like bacteria, parasites, fungi, and viruses, as well as by trauma or allergies. Common pathogens in genital infections include *Candida albicans*, *Trichomonas vaginalis*, *Gardnerella vaginalis*, gonococcus, *Treponema pallidum*, HSV, and HPV (Manga, 2015; Fornari et al., 2016; Gharaghani et al., 2022).

Symptoms of vulvovaginitis include abundant vaginal discharge, itching, burning sensations during urination, vulvovaginal ulcerations, unpleasant odors, and pain (dyspareunia) during sexual intercourse. This condition can occur at any age. Labama further stated that factors such as moral decadence, widespread and often uncontrolled use of medications, and misunderstandings regarding hygiene practices can alter the natural biological conditions of the vaginal environment, weakening its defense mechanisms.

Vaginal discharge, a key indicator of lower genital infections, is the most common reason for gynecological consultations in sexually active women worldwide. *Trichomonas vaginalis* is considered the most common non-viral sexually transmitted infection (STI), with an estimated 170 million cases reported annually. In adult females, it is the leading cause of medical consultations. In Canada and the United States, approximately twelve million medical consultations each year are related to vaginal infections, with 3.1% due to vaginal trichomoniasis (Schalkwyk et al., 2015).

According to global statistics and studies, candidal vulvovaginitis is diagnosed in 70 to 80% of the world's population, with 25% to 50% of cases remaining asymptomatic (Ferrer, 2000; Jaldani et al., 2021; Ge et al., 2022). In Africa, a study in Bamako, Mali, in 1999 found prevalence rates of 10.5% for gonococcal disease, 25.9% for *Trichomonas vaginalis*, and 27.1% for *Candida albicans* in pregnant women (Kattran, 2000; Koulibaly, 2003). Developed countries report that 60 to 80% of women with tubal infertility have had Chlamydial vulvovaginitis (Cerdinal, 2001; Chindamo et al., 2021; Plagens-Rotman et al., 2021). In the Democratic Republic of the Congo (DRC), an epidemiological study at St. Joseph's Hospital in

Kinshasa showed a 27.65% incidence rate of candida in adult women, while studies in Kisangani reported an overall frequency of 15.33% for vulvovaginitis (STI) and 7.2% for candidal vulvovaginitis (Masika, 2010; Ngalina, 2011; Butso, 2012). Vulvovaginitis, if not properly managed, can progress to upper genital infections, leading to serious obstetric and gynecological complications such as preterm labor and delivery, premature rupture of membranes, spontaneous abortion, chorioamnionitis, postpartum endometritis, post-cesarean wound infections, subclinical pelvic inflammatory syndrome, cervical cancer, tubal obstruction resulting in ectopic pregnancy or secondary infertility, pelviperitonitis, and even death. Candidal vulvovaginitis is a common condition, affecting most women at least once in their lives (Schalkwyk et al., 2015; Cooke et al., 2022). Treatment of vulvovaginitis is more accessible in developed countries due to well-organized health systems, technological advancements in diagnostic equipment, and the availability of quality medications. However, in developing countries like the DRC, access to proper treatment is limited. The study aims to identify the epidemiology and clinical features of vulvovaginitis in Kisangani to improve its management, reduce its prevalence, and minimize its complications. This study also aims to provide a foundational document for future researchers and clinicians interested in vulvovaginitis, emphasizing the importance of improving its management and reducing its long-term impact on the population of the DRC, particularly in Kisangani.

METHODS

Survey population

The present study includes 1966 patients who were seen and treated in the gynecology and obstetrics department of the University Clinics of Kisangani during the period from January 1, 2012, to December 31, 2014: three years.

Study type

A retrospective descriptive study based on a review of the literature was conducted, covering three years in the Department of Gynecology and Obstetrics at the University Clinics of Kisangani city.

Data collection techniques

To collect the data, the technique of documentary analysis was used, which involved systematically examining patient

files in the gynecology and obstetrics department for each case of vulvovaginitis. Data were collected using a pre-established form that included headings for socio-demographic factors (such as age, marital status, occupation of the patient and partner, address, and level of education), history of sexually transmitted infections (STIs), presenting complaints (such as vulvar discharge, pelvic pain, dyspareunia, vulvovaginal pruritus, and vulvar ulceration), etiology of vulvovaginitis, and treatment outcomes (including cure, recurrence, and progression to upper genital infection).

Data processing techniques

The collected data was compiled into frequency tables and analyzed using percentage calculations and arithmetic mean. The following formulas were applied:

a) Percentage $\frac{f_o}{N} \times 100$
 fo: Frequency;
 N: Size of sample;
 100: Constant

b) Average $X = \frac{\sum xi}{N}$, either: $\sum =$ sum;
 X= Average;
 Xi= centre point.

RESULTS AND DISCUSSION

Frequency of vulvo-vaginitis

Table 1:
 Frequency of vulvovaginitis hospitalisations per year

Year	Patient numbers	Observed cases	Percentage
2012	706	98	4.98
2013	607	101	5.13
2014	590	101	5.13
Total	1966	298	15.2

Table 1 shows the frequency of vulvovaginitis by year. It reveals that out of 1,966 patients admitted to the Gynecological Obstetrics Department during the study period, 298 patients suffered from vulvovaginitis, representing 15.2% of the total. These findings align with those of *Ngalina (2011)* and *Dialo (1993)*, who reported vulvovaginitis frequencies of 15.33% and 17.85%, respectively. In contrast, *Soumare (1988)* found a higher frequency of 49.9%. The lower frequency in the current study can be attributed to vulvovaginitis not being a

notifiable disease in the country and to poverty leading to reduced healthcare facility visits, with patients resorting to self-medication or traditional treatments.

Sociodemographic characteristics

Age

Figure 1:
 Distribution of cases by age group

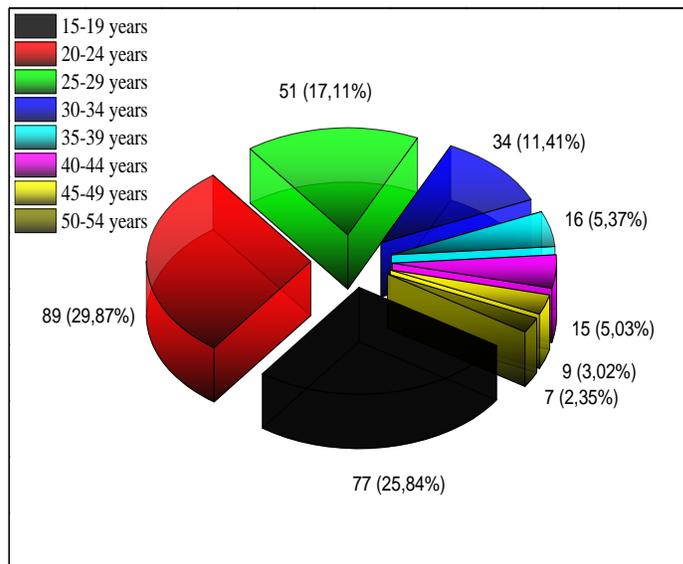


Figure 1 shows the distribution of cases by age group. It indicates that the highest proportion of cases fell within the 20-24 age group, accounting for 29.9%, followed by the 15-19 age group at 25.8%, 25-29 years at 17.1%, 30-34 years at 11.4%, 35-39 years at 5.5%, 40-44 years at 5%, 45-49 years at 3%, and finally 50-54 years at 2.3%. These findings are consistent with several other studies. For instance, *Cheikh (2002)* reported that the most affected age group is 15 to 24 years, accounting for 33.9%, while *Coulibaly (2003)* found that 53% of cases were in the 15 to 24 age group. *Butso (2012)* identified the most affected age group as 20 to 24 years, representing 10% of cases. In contrast, *Masika (2010)* found the highest frequency of candida albicans vulvovaginitis in women aged between 30 and 39 years, at 52%. The higher prevalence in the 20-24 age group can be attributed to the fact that this age range corresponds to a period of heightened sexual activity among women. Despite the increasing availability and accessibility of condoms, their utilization remains low or underappreciated by many young individuals.

Youth is also considered a risk factor for sexually transmitted infections (STIs)/AIDS due to its association with sexual behavior. Additionally, specific characteristics of young women and adolescents, such as having multiple sexual partners, contribute to the spread of lower genital infections (Kaluma, 2011).

Marital status

Figure 2:
Marital status of patients

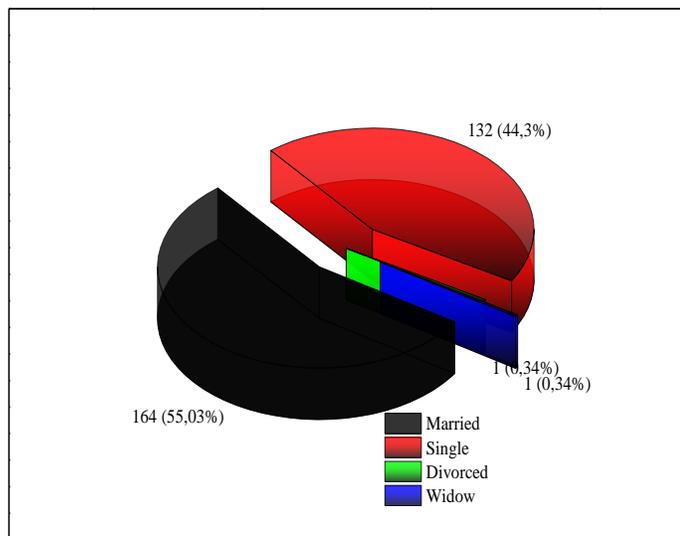


Figure 2 shows the distribution of cases by marital status. It illustrates that the majority of vulvovaginitis cases were found in married women (55.03%), followed by single women (44.3%), and a small percentage in divorced and widowed women (0.34% each). Similar results have been reported in other studies. For example, Coulibaly (2003) found 87% of cases in married women and 12% in single women, while Diawam (2008) reported 47.2% in married women and 29.8% in single women. Nomogo (2010) found 64% in married women and 23.4% in single women, Cheikh (2002) found 68.3% in married women and 29.1% in single women, and Masika (2010) found 42% in married women and 23% in unmarried women. This trend can be explained by several factors. Firstly, married women often experience pregnancy, which can lead to changes in the immune system, reducing immune defenses—a phenomenon known as "pregnancy-related immunodeficiency syndrome," as described by Weinberg in 1984. Studies have shown the immunosuppressive effects of progesterone, human chorionic gonadotropin (hCG), human placental lactogen (hPL), and other pregnancy-related glycoproteins.

Secondly, married women may engage in frequent and intense sexual activity, which can lead to microtrauma to the vaginal mucosa and increase the risk of post-coital vulvovaginitis. Additionally, African cultural practices, such as polygamy and other forms of sexual promiscuity, may contribute to the higher frequency of vulvovaginitis in married women (Coulibaly, 2003).

Level of education

Figure 3:
Distribution of cases by level of study

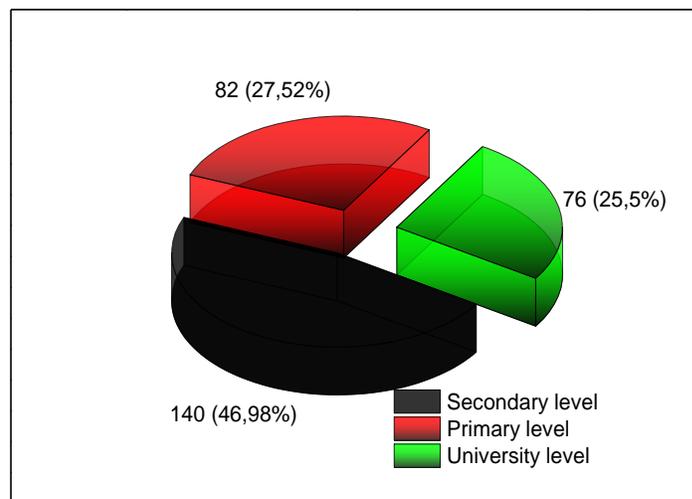


Figure 3 shows the distribution of cases by level of education. It indicates that the majority of vulvovaginitis cases had secondary education (46.98%), followed by primary education (27.52%), and university education (25.5%). This distribution is similar to the distribution in the findings of Ngalina (2011), who reported that 52.04% of cases had secondary education. The predominance of secondary education can be explained by several factors. Firstly, it is often during the later years of secondary school that many girls have their first sexual experiences, often without a clear understanding of condom use. Secondly, cultural norms and traditions often pressure girls to consider marriage after completing secondary education. Additionally, during the teenage years, students at the secondary level may be more prone to multiple sexual solicitations, increasing their risk of vulvovaginitis.

Profession

Figure 4: Distribution of patients by profession

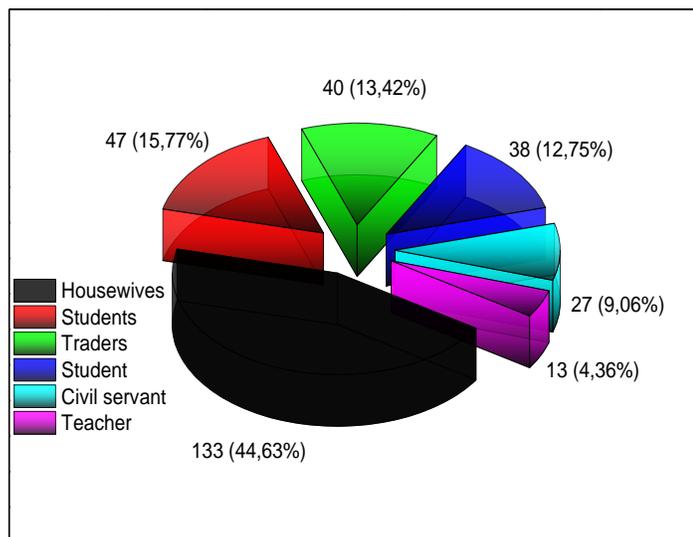


Figure 4 shows the distribution of patients by profession. It illustrates that the majority of vulvovaginitis cases occur among housewives (44.63%), followed by schoolchildren (15.77%), traders (13.42%), students (12.75%), civil servants (9.06%), and teachers (4.36%). Similar findings have been reported in other studies. For example, Diawara (2008) found that 47% of cases were among housewives, followed by shopkeepers at 14.25%. Coulibaly (2003) reported much higher rates, with 72% of cases represented by housewives. While the frequency of vulvovaginitis among housewives is high, being a housewife is not considered a determining factor in the occurrence of vulvovaginitis. However, it is worth noting the influence of married women's reluctance to use condoms on the occurrence of vulvovaginitis.

Address of illness

Figure 5: Distribution of cases by address

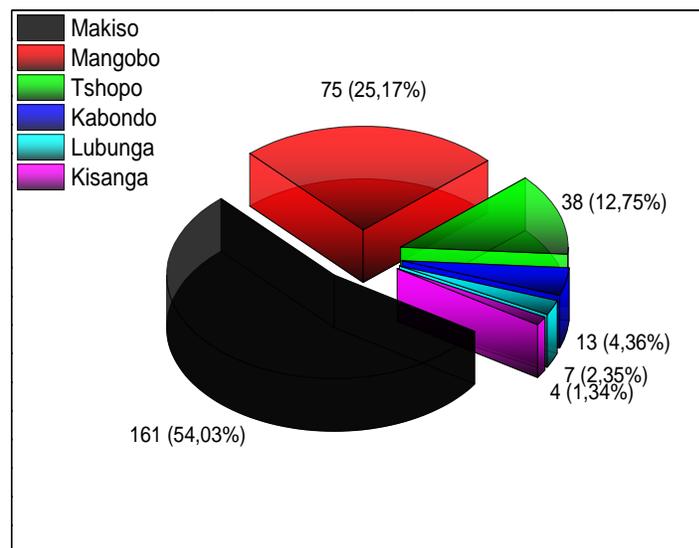


Figure 5 shows the distribution of cases by address. It indicates that the majority of vulvovaginitis cases occurred in Makiso (54.03%), followed by Mangobo (25.17%), Tshopo (12.75%), Kabondo (4.36%), Lubunga (2.35%), and Kisanga (1.34%). These findings are like those of Ngalina (2011), who reported that patients living in the communes of Makiso, Tshopo, and Mangobo accounted for 37.75%, 23.46%, and 21.42% respectively. The high prevalence in Makiso, Mangobo, and Tshopo can be attributed to several factors. Firstly, these communes are known as "hot communes" due to the presence of numerous leisure centers, bars, nightclubs, and shopping centers. They are densely populated, with a significant portion of the population living in conditions of promiscuity, poverty, and poor moral standards. The various relaxation spots in these communes serve as meeting places and facilitate sexual relations with multiple partners. Additionally, these communes are near the University Clinics of Kisangani, making them convenient healthcare options for residents.

Clinical aspects

History of STI

Figure 6: Breakdown of cases by STI history

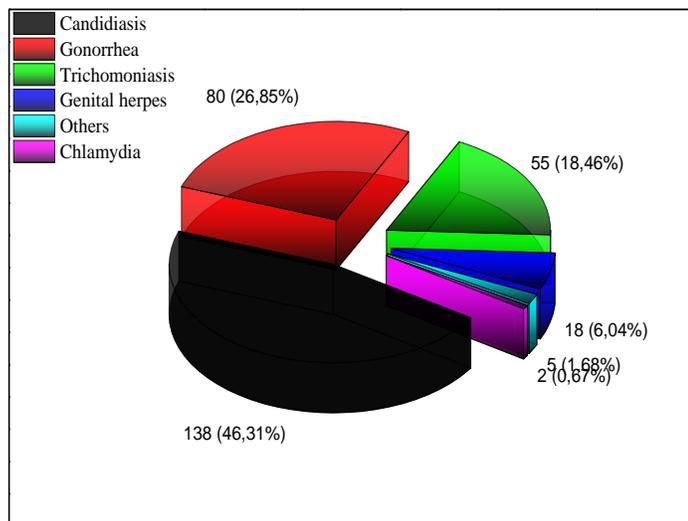


Figure 6 shows the distribution of cases according to STI history. It illustrates that the most common antecedent for patients was vaginal candidiasis (46.31%), followed by gonorrhea (26.85%), vaginal trichomoniasis (18.46%), genital herpes (6.04%), other (1.68%), and chlamydia (0.67%). These findings align with the literature, which indicates that vulvovaginal candidiasis is a prevalent condition, affecting more than 75% of women with at least one recurrence in their lifetime. Risk factors for *Candida albicans* vulvovaginitis include age (with most of our patients being between 20 and 24 years old, a period associated with intense sexual activity), excessive use of antibiotics, and inadequate hygiene practices that can alter vaginal flora, favoring candida development (Ferrer, 2000).

Complaint on admission

Figure 7: Distribution of cases according to complaints on admission

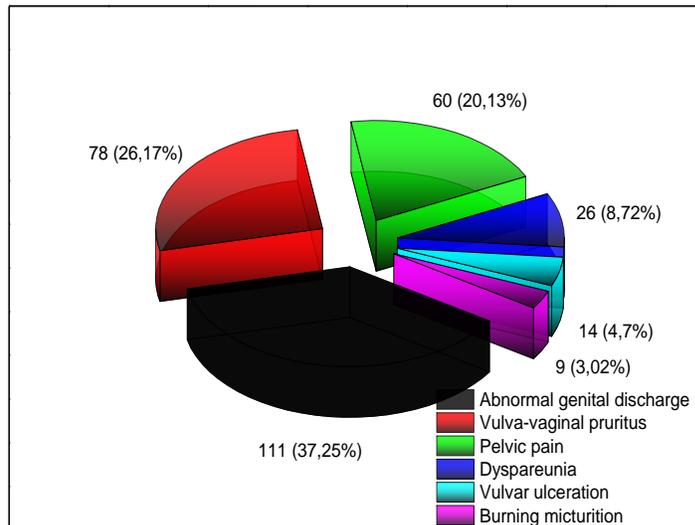


Figure 7 shows the distribution of cases concerning complaints on admission. It indicates that most patients sought consultation for abnormal genital discharge (37.25%), followed by vulvovaginal pruritus (26.17%), pelvic pain (20.13%), dyspareunia (8.72%), vulvar ulceration (4.7%), and burning micturition (3.02%).

These findings are consistent with the literature and several other studies. For example, Nomogo (2010) reported that 24.63% of patients had vaginal discharge as their main complaint, like the current findings. Musafiri (2012) found that 38.2% of consultations were for leucorrhoea, followed by vulvovaginal pruritus at 24.8%. Diawara (2008) reported a much higher rate, with 50.5% of consultations motivated by leucorrhoea. The high rate of leucorrhoea in this study can be attributed to its status as the primary reason for gynecological consultations. Several authors agree that leucorrhoea is part of the triad of symptoms that constitute the main reason for consultation in obstetric gynecology.

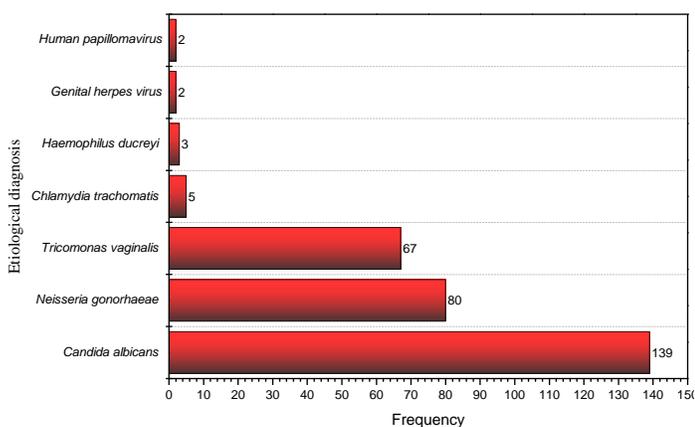
*Etiological aspects***Figure 8:**
Distribution of cases by aetiological diagnosis

Figure 8 shows the distribution of patients by aetiological diagnosis. It shows that the most common causes of vulvovaginitis are *Candida albicans* (46.64%), followed by *Neisseria gonorrhoeae* (26.84%), *Trichomonas vaginalis* (22.48%), *Chlamydia trachomatis* (1.67%), and *Haemophilus ducreyi* (1%). Human papillomavirus (HPV) and herpes simplex virus (HSV) each account for 0.67%. This finding is like that of [Coulibaly \(2003\)](#), who reported 47% of vulvovaginitis cases with *Candida albicans* as the main cause. The high frequency of *candida albicans* vulvovaginitis in the present study can be explained by the presence of risk factors in patients, including age (most of our patients are between 15 and 24 years old, with an average age of 19.5 years, a period characterized by intense sexual activity), and excessive use of broad-spectrum antibiotics, all of which promote the development of *Candida albicans* ([Butso, 2012](#)).

CONCLUSION AND RECOMMENDATIONS

The prevalence of vulvovaginitis at the University Clinics of Kisangani during our study period was 15.2%. The average age of our patients was 19.5 years, with the majority being married housewives who had completed secondary education and resided in the communes of Makiso, Mangobo, and Tshopo. A history of sexually transmitted infections was found in most cases, with genital discharge (leucorrhoea) being the primary complaint. The most common causes of vulvovaginitis in this study were *Candida albicans*, *Neisseria gonorrhoeae*, and *Trichomonas vaginalis*. Based on these findings, the following actions are

recommended: equip the University Clinics of Kisangani laboratory with the necessary equipment for accurate diagnosis, promote public awareness campaigns about vulvovaginitis transmission, symptoms, and complications, educate patients about proper management and treatment duration, encourage responsible sexual behavior and condom use, discourage self-medication, and encourage prompt medical evaluation for suspected vulvovaginitis. Additionally, further research to expand knowledge and address any gaps or errors is recommended.

Acknowledgments: We are grateful to the authors whose works have enriched this study.

Ethical Approval: Not applicable

Conflicts of Interest: None declared.

ORCID iDs:

Dawili, D. K. ¹ :	Nil identified
Djolu, R. D. ² :	Nil identified
Ndaba, M. M. ³ :	Nil identified
Moleke, R. A. ⁴ :	Nil identified
Masengo, C. A. ^{4,5} :	Nil identified
Mawunu, M. ⁶ :	Nil identified
Komanda, E. L. ⁷ :	Nil identified
Ngbolua, K. N. ^{5,8} :	https://orcid.org/0000-0002-0066-8153

Open access: This original article is distributed under the Creative Commons Attribution Non-Commercial (CC BY- NC 4.0) license. Anyone can distribute, remix, adapt, build upon this work, and license the product of their efforts on different terms provided the original work is properly cited, appropriate credit is given, any changes made are indicated and the use is non-commercial (<https://creativecommons.org/licenses/by-nc/4.0/>).

REFERENCES

- Butso, M.** (2012). *Epidemiological and Clinical Approach to Candidal Vulvovaginitis in Kisangani*, Medical Thesis/University of Kisangani, Democratic Republic of the Congo (French).
- Cerdinal, V** (2001). Recurrent Vaginal Candidiasis: *Candida albicans*. Pharmacy Thesis, University of Henri Poincaré Nancy-I, France (French).
- Cheikh, C.** (2002). Determination of the Prevalence of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* Infections. Pharmacy Thesis, Cheikh Anta Diop University, Dakar, Senegal (French).
- Chindamo, G., Sapino, S., Peira, E., Chirio, D., Gallarate, M.** (2021). Recent Advances in Nanosystems and Strategies for Vaginal Delivery of Antimicrobials. *Nanomaterials (Basel)*. 11(2):311. doi: 10.3390/nano11020311. PMID: 33530510; PMCID: PMC7912580.

- Cooke, G., Watson, C., Deckx, L., Pirotta, M., Smith, J., van Driel, M. L.** (2022). Treatment for recurrent vulvovaginal candidiasis (thrush). *Cochrane Database Syst Rev.*;1(1):CD009151. doi: 10.1002/14651858.CD009151.pub2. PMID: 35005777; PMCID: PMC8744138.
- Coulibaly, K** (2003). *Etiological Diagnosis of Vaginal Discharge and Evaluation of Syndromic Management by Prescribers*. Gynecology Thesis, Bamako, Mali (French).
- DCM2.** (2006). *Gynecology*, Faculty of Medicine, Pierre and Marie Curie University (University of Paris VI), France (French).
- Diallo, R.** (1993). *Prevalence of Neisseria gonorrhoeae, Trichomonas vaginalis, Candida albicans, and Gardnerella vaginalis Among Etiological Agents of Female Genital Infections in Bamako: A Study of 4710 Vaginal Samples Examined in the Bacteriology Laboratory of INRSP from 1989 to 1992*. Doctoral Thesis in Pharmacy, 74 pages (French).
- Ferrer, J** (2000). Vaginal candidosis: Epidemiological and etiological factors. *International Journal of Gynecology and Obstetrics* 71, S21.
- Fornari, G., Vicente, V. A., Gomes, R. R., Muro, M. D., Pinheiro, R. L., Ferrari, C., Herkert, P. F., Takimura, M., Carvalho, N. S., Queiroz-Telles, F.** (2016). Susceptibility and molecular characterization of Candida species from patients with vulvovaginitis. *Braz J Microbiol.*; 47(2), 373-80. doi: 10.1016/j.bjm.2016.01.005. Epub 2016 Mar 2. PMID: 26991298; PMCID: PMC4874609.
- Ge, G, Yang, Z., Li, D., Zhang, N., Chen, B., Shi, D.** (2022). Distinct host immune responses in recurrent vulvovaginal candidiasis and vulvovaginal candidiasis. *Front Immunol.* 13, 959740. doi: 10.3389/fimmu.2022.959740. PMID: 35967437; PMCID: PMC9366074.
- Gharaghani, M, Shabanzadeh, M., Jafarian, H., Zarei, M. A.** (2022). ABC typing and extracellular enzyme production of Candida albicans isolated from Candida vulvovaginitis. *J Clin Lab Anal.* 36(1), e24117. doi: 10.1002/jcla.24117. Epub 2021 Nov 27. PMID: 34837715; PMCID: PMC8761456.
- Jaldani, S., Fatahinia, M., Maraghi, E., Moghimipour, E., Javadnoori, M.** (2021). Comparison of the effectiveness of Satureja khuzestanica and clotrimazole vaginal creams for the treatment of vulvovaginal candidiasis. *J Med Life.* 14(1), 111-117. doi: 10.25122/jml-2020-0014. Erratum in: *J Med Life.* 2021 Nov-Dec;14(6):871. PMID: 33767795; PMCID: PMC7982263.
- Kaluma, M.** (2011). *Notes on Sexually Transmitted Infections*, University of Kisangani, Democratic Republic of the Congo (French).
- Katran, N.** (1999). *Study on the Prevalence of STDs/HIV Risk Factors in Pregnant Women in the Regions of Koulikoro and Sikasso*. Doctoral Thesis, Republic of Mali (French).
- Labama, L.** (2005). *Manual of Gynecology*, University Press UNIKIS, University of Kisangani, Democratic Republic of the Congo (French).
- Lamboitte.** *Notes on Gynecological Pathology*, University of Liège, Belgium (French).
- Lansac, J., Lecomte, P.** (2018). *Gynecology for the Practitioner*, 5th Edition, Masson III, Paris (French).
- Lobo, F. D. S.** (2013). *Management of Vulvovaginitis and Mastitis in Prepubescent Girls in General Medicine*. Doctoral Thesis: University Toulouse III - Paul Sabatier - Faculty of Medicine, Paris, France (French).
- Makanjuola, O., Bongomin, F., Fayemiwo, S. A.** (2018). An Update on the Roles of Non-albicansCandida Species in Vulvovaginitis. *J Fungi (Basel).* 2018; 4(4):121. doi: 10.3390/jof4040121. PMID: 30384449; PMCID: PMC6309050.
- Manga, O** (2015). *Notes on Gynecology*, University of Kisangani, Democratic Republic of the Congo (French).
- Masika, MH** (2010). *Epidemiological Study on Candidal Vulvovaginitis in Adult Women in the City of Kinshasa*. Thesis: Bel Campus University of Technology in Kinshasa, Democratic Republic of the Congo (French).
- Ngalina, N.** (2011). *Sexually Transmitted Infection: Frequency, Etiology, and Management at the University Clinics of Kisangani*. Thesis, University of Kisangani, Democratic Republic of the Congo (French).
- Nomogo, F. K.** (2010). *Epidemiological and Clinical Profiles and Evaluation of Syndromic Management of STI Cases and HIV/AIDS Cases in the Reference Health Center of*

Bougouni (Bamako, Mali). Doctoral Thesis (French).

- Plagens-Rotman**, K, Drejza M, Kędzia W, Jarzabek-Bielecka G. (2021). Gynaecological infections in paediatric and adolescent gynaecology: a review of recommendations. *Postepy Dermatol Alergol*. 38(5):734-739. doi: 10.5114/ada.2021.110084. Epub 2021 Nov 5. PMID: 34849117; PMCID: PMC8610037.
- Seydou**, S. D. M. (2008). *Evaluation of the Effectiveness of STI Treatment According to the Syndromic Approach*. Doctoral Thesis, Mali (French).
- Soumare**, D. (1988). *Lower Genital Infections in Consultations at the Gynecology-Obstetrics Department of Point G Hospital (157 Observations)*. Medical Thesis, University of Bamako, Mali (French).
- Van Schalkwyk**, J., Vancouver, C.-B., Yudin, M. H., et al. (2015). Vulvovaginitis: Screening and Management of Trichomoniasis, Candidal Vulvovaginitis, and Bacterial Vaginosis, *SOGC Clinical Guideline, No. 320* (French).
- Yasin**, J, Ayalew, G., Dagnaw, M., Shiferaw, G., Mekonnen, F. (2021). Vulvovaginitis Prevalence Among Women in Gondar, Northwest Ethiopia: Special Emphasis on Aerobic Vaginitis Causing Bacterial Profile, Antimicrobial Susceptibility Pattern, and Associated Factors. *Infect Drug Resist*. 14, 4567-4580. doi: 10.2147/IDR.S337205. PMID: 34754204; PMCID: PMC8572045.
- Yassin**, M. T., Mostafa, A. A., Al-Askar, A. A., Bdeer, R. (2020). In vitro antifungal resistance profile of Candida strains isolated from Saudi women suffering from vulvovaginitis. *Eur J Med Res*.; 25(1),1. doi: 10.1186/s40001-019-0399-0. PMID: 31901238; PMCID: PMC6942276.