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Prevalence of vaginal infections and associated lifestyles of students in the university of Cape Coast, Ghana

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PEER REVIEW

Peer reviewer

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Comments

All in all this is a well-written paper revealing important findings about vaginitis and the associated causal factors. It also showed that higher education does not necessarily negate practices that lead to the disease reaffirming the casual factors as well as introducing additional factors such as dressing in appropriately.

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ABSTRACT

Objective: To determine the prevalence of vaginal infections and associated lifestyles of students visiting the University of Cape Coast Hospital.

Methods: Fifty female students presenting with clinical symptoms of vaginitis were sampled. One hundred samples made up of 50 urine and 50 higher vaginal swabs (HVS) were obtained from patients and questionnaire administered. Samples were wet prepared, examined microscopically, and cultured on blood and chocolate agars for 24 h at (35±2) °C. Colonial morphology, Gram reactions and biochemical tests were used for the identification of isolates.

Results: There were high percentages of pus cells (64%), epithelial cells (62%) and yeast cells (56%) in all urine samples. Bacterial isolates included *Staphylococcus aureus* (28%) and (22%), *Klebsiella* spp. (6%) and (4%) in urine and HVS samples respectively; *Escherichia coli* in urine (18%) and *Candida* in HVS (16%). The overall prevalence of vaginitis was 66%, including bacterial vaginosis 28%, *Candida* infection 22% and co-infection of bacterial and *Candida* 16%. Lifestyle data showed all sampled students were sexually active, 48% used contraceptives, 54% used antimicrobial agents, and 92% preferred wearing of trousers and shorts.

Conclusions: The present study indicates prevalence of vaginal infection among female students, which strongly correlates with student lifestyle. Education on lifestyle modifications will go a long way in reducing the prevalence of vaginitis.

KEYWORDS

Vaginitis, Prevalence, Bacterial vaginosis, Pus cells, Epithelial cells, *Candida* spp.

1. Introduction

Vaginitis, which is simply the inflammation of the vaginal, is the most frequent gynaecologic diagnosis encountered by physicians who provide primary care to women[1–3]. The prevalence and causes of vaginitis are uncertain, in part because the condition is so often self-diagnosed and self-treated. In addition, vaginitis is frequently asymptomatic or has more than one cause. Non-infectious causes include vaginal atrophy, allergies and chemical irritation. Most experts however, believe that up to 90% of vaginitis cases are

secondary to bacterial vaginosis, vulvovaginal candidiasis and trichomoniasis with the prevalence of bacteria vaginosis (BV) estimated to range between 9% and 50% and could be as high as 70% in female sex workers (FSW)[2–5]. In the United States, bacterial vaginosis is currently the most common cause of vaginitis, accounting for >30% of cases in women of childbearing age[6]. This infection is believed to be caused by proliferation of a number of organisms, including *Gardnerella vaginalis*, *Mobiluncus* species, *Mycoplasma hominis* and *Peptostreptococcus* species[7]. It is believed to predispose infected women to the development of herpes

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simplex virus type 2 (HSV-2), *Trichomonas vaginalis*, *Nisseria gonorrhoeae*, *Chlamydia trachomatis* and recently HIV acquisition and transmission^[8–10]. BV appears to be particularly common albeit with highly varied prevalence in sub-Saharan Africa with several studies reporting rates as low as 8% to a high of about 58% from different sampling conditions and regions^[11–14]. In Ghana, it is estimated that about 25% of women are infected with BV^[15]. These contrast sharply with trends in industrialised countries such as North America and especially among whites, which is as low as 8.8%, but could be as high as 51% among Hispanics, blacks and aborigines^[1,16–17]. Europe had even much lower prevalence, 5.9% in Ireland^[11] and 13.7% in Denmark^[18]. Risk of BV has been associated with intravaginal practices most importantly douching^[19]. Recently however, intravaginal use of petroleum jelly has been correlated with BV especially in sex workers in Kenya^[20]. Besides a limited study of BV prevalence, there is no current data on the levels and trends of BV infections in Ghana and especially contributing factors to the levels of infections. Thus this study was undertaken to determine the prevalence of vaginitis as well as contributing lifestyles of students to this infection on University of Cape Coast campus, Ghana.

2. Materials and methods

The study was undertaken at the University of Cape Coast Hospital, which served students and staff of the university as well as allied communities around the university. Ethical clearance was obtained from the university hospital whilst patients were recruited after obtaining their informed consent. All procedures followed were in accordance with the ethical standards Ministry of Health, Ghana as well as the Helsinki Declaration of 1975^[21].

2.1. Sampling

Purposive sampling technique was used to recruit 50 patients attending the hospital and expressing symptoms of vaginitis as evaluated by a physician. A trained female biomedical scientist obtained high vaginal swab (HVS) samples from all the patients before early morning bath as well as mid-stream urine after which a questionnaire was administered.

2.2. Method

2.2.1. Urine samples

The urine samples obtained were wet prepared by centrifuging 10–15 mL in a test tube, discarding the supernatant, tapping to mix the sediment, placing a drop on a grease free slide and covering with a cover glass for microscopy using the 10× and 40× objective for the detection of white cells (pus cells), red cells, yeast cells, cast and epithelia cells. Urine samples were mixed thoroughly and streaked on cysteine lactose electrolyte-deficient agar (CLED) and incubated overnight at (35±2) °C for the isolation of both Gram positive and negative organisms.

2.2.2. HVS samples

Sampled swabs were inoculated on blood agar (BA) and chocolate agar (CA) after which a wet preparation of each swab was undertaken by adding a few drops of physiological saline in a test tube, shaking and placing some drops on a grease free slide for microscopy after which Gram staining techniques was employed in obtaining Gram reaction of each sample.

2.3. Statistical analysis

Data obtained in the study were descriptively analyzed using Statview from SAS Version 5.0. SPSS Version 16.0 was used in analysis of questionnaire.

3. Results

Results of wet preparation analysis of urine samples from the study showed high levels of pus (64%), epithelia (62%) and *Candida* spp. (56%) cells in all urine samples. Similarly, all HVS samples showed very high pus and epithelial cells (100%). *Candida* spp. was isolated in 58% of the HVS samples. Bacterial isolates from the urine samples included *Staphylococcus aureus* (*S. aureus*) (28%), *Escherichia coli* (18%), *Klebsiella* spp. (6%), *Proteus* spp. (4%), and *Citrobacter* spp. (4%). Culture analysis of results of HVS samples indicated pure growth of *S. aureus* and *Candida* spp. of 22% each with mixed growth of *S. aureus* and *Candida* spp. 16% and *Pseudomonas* spp. of 2%. Prevalence of BV was 28% whilst that of *Candida* spp. infection was 22%. Co-infection of BV and *Candida* was 16% resulting in an overall vaginitis prevalence of 66%. Majority of the students were aged 18–25 (70%), followed by 26–33 (22%) and 34–41 (8%). All the students (100%) claimed to be sexually active out of which 48% used some form of contraceptive. Fifty-four percent of the sampled students used antimicrobial agents in douching whereas as much as 92% continuously wear trousers and prefers wearing trousers to lectures and undertaking daily activities. Within the age distributions, 62.5% of 18–25 year olds used contraceptives, 66.7% applied antimicrobial agents in douching and 74% had a preference for dressing in trousers. For 26–33 year group, 29.2% used contraceptive, 25.9% used antimicrobial agents for douching and 21.7% wore trousers often. About 8% of the females within age group 34–41 used contraceptives, 7.4% douched with antimicrobial agents whilst 4.3% wore trousers. However, the highest bacterial isolation in urine (175%) was observed in age group 34–41 (7 from 4 patients sampled), followed by 26–33 (109%) (12 from 11 patients sampled) and then 18–25 (54.3%) (19 from 35 patients sampled).

4. Discussion

The above high percentages of pus cells (64% in urine and 100% in HVS) and epithelia cells (62% in urine and 100% in HVS) as well as yeast cells (56% in urine samples) and *Candida* spp. (58% in HVS samples) are indicative of infection

conforming to literature^[22]. The BV prevalence of 28% conforming to research findings in other African countries such as Zimbabwe and Tanzania were that BV prevalence was reported to range between 20% to 230% but lower than that of Uganda (34.4%) and South Africa (58%) respectively^[11–13,23]. The prevalence was similar to an earlier work undertaken in females attending family planning clinics in Accra, Ghana^[15]. Although the cause of high BV prevalence in Africans is not exactly known, lifestyle practices like vaginal douching have been associated with an increased prevalence of BV^[19]. This was confirmed by the high percentages of the sample population (54%) undertaking douching practices on daily basis with antimicrobial agent. A recent study in rural Turkey reported that the percentage of females undertaking douching was as much as 91.6%^[24], which is quite high. Douching is believed to alter the dominant flora of the vagina and, thus, increase susceptibility to BV^[19,25]. The fact that all the sampled students with sexually active could be one of the reasons for the high BV prevalence since research has shown sexual activity to be one of the predisposing factors to BV^[19,26] as well as the use of contraceptives^[27]. Vulvovaginal candidiasis is the second most common cause of vaginitis in the United States and the most common cause in Europe^[28] confirming the prevalence of *Candida* infection in this work. Risk factors of candidiasis include sexual activity^[29,30] and the use of contraceptives^[31] directly correlating the current research findings. Additional factor that is believed to cause vaginitis is the wearing of tight pants or trousers, especially leggings, which is the fashionable dressing on the various campuses now. It is believed to cause leggings vaginitis^[32] due to the fact that such pants including hipsters and trousers are made from materials which make them airtight, limiting air movement around the vagina, leading to stuffiness in the area especially in the hot African weather^[33]. This causes vaginal discharge which is suitable for the breeding of bacterial and other microorganisms leading to vaginitis.

The study has demonstrated clearly the fact that lifestyle of students is the prevailing contributor to the prevalence of vaginitis on the campus. Further studies should be undertaken through a screening and treatment programmes after which students would be educated on the several risks associated with vaginitis such as infertility, miscarriages, postpartum endometritis, neonatal conjunctivitis and infant pneumonitis.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

Vaginitis, especially bacterial vaginosis, is increasingly being associated with predisposition to several diseases and this makes its study and understanding paramount. Although cultural and ethnic as well as environmental conditions are potential contributory factors, lifestyle and sexuality are also known to be important predisposing factors.

Research frontiers

Few studies have associated general lifestyle, dressing and sexuality with vaginitis in Ghana. Although data of prevalence is increasing in other African countries, Ghana has only one data on prevalence with no correlated causative epidemiology. Additionally, vaginitis has been associated with rural and lower educated populace. This studies exposed trends of prevalence in highly educated individuals as well as common practices that predispose them to these infections

Related reports

The results from this research compares favorably with the one performed previously in Ghana and other African countries both in prevalence and causal factors such as douching. This is surprising, since for highly educated populace such as university students and their ease of access to information, one will expect that they will realize the effect of douching.

Innovations & breakthroughs

This paper has exposed fundamentally, that higher level of education does not necessarily change cultural, and habitual practices such as douching. Also that modern lifestyle such as wearing 'hot' and tight pants especially in extremely hot conditions are additional factors to be considered in the etiology of vaginitis.

Applications

It is important to know that highly ingrained cultural practices are not easily overcome as a result of high education. Also that in appropriate dressing could contribute to vaginitis. And that it is important to educate everyone on the dangers of inappropriate intravaginal practices and its possible impacts on one's health and the community through distribution of some sexually transmitted diseases.

Peer review

All in all this is a well-written paper revealing important findings about vaginitis and the associated causal factors. It also showed that higher education does not necessarily negate practices that lead to the disease reaffirming the casual factors as well as introducing additional factors such as dressing in appropriately.

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