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Research Article

Prevalence of Vulvo-Vaginitis and Risk Factors Among Women of Reproductive Age in Port Harcourt

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Abstract:

Background: The yeast-like fungus *Candida albicans*, a common resident of the mouth, vagina, and intestinal tract, is the source of the infectious disease known as candidiasis.

Aim: This research is aimed at determining the prevalence of vulvo-vaginitis and risk factors among women of reproductive age in Port Harcourt.

Methodology: This research study was a cross-sectional study consisting 450 randomly selected women attending Rivers State University Teaching Hospital. The participants were categorized into four groups; Out Patients, Pregnant women, HIV positive women and Healthy volunteers. A total of 150 urine samples were collected from out patients, 100 urine samples were collected from pregnant women, 100 urine samples were collected from HIV positive women and 100 urine samples were collected from students (healthy volunteers). A total of 200 HVS samples were collected across all groups and 50 samples from each groups. Via a well-structured questionnaire, data regarding risk factors (awareness, personal hygiene and lifestyle) of candida infection were obtained. Urine samples were tested macroscopically, microscopically and by culturing. HVS samples were tested microscopically and culturing using germ tube test.

Results: There was no association (p-value>0.05) between candidiasis and awareness parameters in urine and HVS. There is association (p-value<0.05) between candidiasis and washing, wash private parts, wash with, tight underwear in HVS. Under personal hygiene, there is association (p-value<0.05) between candidiasis and clean after urination in urine but there was no association (p-value>0.05) between candidiasis and repeat underwear. Under lifestyle, there is association (p-value<0.05) between candidiasis and unprotected sex and STI screening of partner in HVS. There was no association (p-value>0.05) between candidiasis and sexually active, protect with and STI screening self in both urine and HVS.

Conclusion: This study personal hygiene practice and lifestyle are factors that affect the spread of candidiasis among women attending RSUTH.

Keywords: candida albicans, vagina, diseases, sexually transmitted disease.

1. Introduction

The yeast-like fungus *Candida albicans*, a common resident of the mouth, vagina, and intestinal tract, is the source of the infectious disease known as candidiasis [1]. Candida typically has no negative effects, with the exception of those who are weakened by diseases like diabetes, STDs, HIV, or certain physiological conditions like pregnancy. Moreover, long-term use of broad-spectrum antibiotics like chloramphenicol and tetracyclines may increase the risk of developing candidiasis, possibly by eliminating the typical microbial enemies of the fungus. Vaginitis, also known as candidiasis of the vaginal mucous membranes, is more prevalent in diabetic or pregnant women. *Candida albicans*, an opportunistic dimorphic pathogenic yeast found on the surface of human mucosal epithelial cells, is the species of candida that primarily causes candidiasis [2]. Most opportunistic fungal infections are caused by it.

According to Naglik [3] and Mayer [4], in addition to other numerous non-pathogenic fungi and benign bacteria, *Candida albicans* is a polymorphic fungus that naturally colonizes mucosal areas such as the stomach, vagina, and oral cavity of many healthy people. The presence of *Candida albicans* does not always mean that you have this organism's infection [3]. The pathogen is opportunistic. As a result, it preys on immunological environments that may be caused by disorders like HIV-related infections, diabetes, chronic antibiotic use, physiological situations like pregnancy, inadequate cleanliness, etc [5]. In addition to colonizing, invading, and multiplying in other body organs, *Candida albicans* has the capacity to do so in the host's mouth cavity [6]. Given that most hospitalized patients have it isolated, it is the most important species of candida from a medical standpoint [7]. It is responsible for the highest pathogenic fungi-related death rate (20–40%) [8]. The pathogenicity of *Candida albicans* is caused by a variety of influencing variables. For the development of therapies, it is essential to have a thorough understanding of the circumstances in which *Candida albicans* colonizes, invades, and infects the host. Researchers have previously looked at these issues [9].

Based on the research carried out by Brocklehurst et al. [10], the significance of bacterial vaginosis in pregnancy has come to awareness recent years, and it has been discovered that pregnant women who have this infection run the risk of experiencing negative pregnancy outcomes such as spontaneous abortion, preterm labor, premature birth, preterm premature rupture of the membranes, amniotic fluid infection, postpartum endometritis, and postcesarean wound infection. It was reported by Ahmad et al. [11] that long-term usage of airtight underwear alters the vagina's normal temperature, and results in wetness or heat in the genital regions, facilitating the development of bacterial and yeast infections there. Sexually active women are more likely to develop bacterial vaginosis [12].

This research is aimed at determining the prevalence of vulvo-vaginitis and risk factors among women of reproductive age in Port Harcourt.

2. Methodology

Study area

This study was carried out in Rivers State University Teaching Hospital (RSUTH), Port-Harcourt, Nigeria. RSUTH is a tertiary hospital own by Rivers State Government and it serves as a reference center for other healthcare facilities in and around the state.

Study design

A total of 450 women between ages of 15-55 were randomly enrolled in this study. They were grouped into four; Out Patients, Pregnant women, HIV positive women and Healthy volunteers. A total of 150 urine samples were collected from Out patients, 100 urine samples were collected from pregnant women attending ante-natal clinic at Rivers State University Teaching Hospital (RSUTH), 100 urine samples were collected from HIV positive women attending the HIV clinic of RSUTH and 100 urine samples were collected from students (healthy volunteers) attending PAMO University of Medical Sciences. A total of 200 HVS samples were collected across all subgroups; 50 samples from each sub groups. Via a well-structured questionnaire, data regarding risk of candida infection were obtained.

Ethical approval

Ethical approval for the study was obtained from the ethics Committees of Rivers State University Teaching Hospital (RSUTH) and also from the ethics Committees' of PAMO University of Medical sciences. Written consent to participate in the study was obtained from each participant.

Eligibility criteria

Inclusion criteria

- Participants who gave their consent to enroll in the study.
- Age groups within 15-55 years were included in the study.
- All pregnant women who tested positive to pregnancy test and negative to HIV test.
- Immuno-compromised females who tested positive to HIV and negative to pregnancy test.
- All healthy controls who tested negative to pregnancy and HIV tests.

Exclusion criteria

- All those who refused giving consent.
- All those who gave consent but were not eligible based on preliminary test results.
- All those below the age of 15 and above 55 years.

Urine sample collection

A Sterile universal container was given to each participant, and they were asked to bring a clean-voided, midstream urine sample which they produced the next morning [13].

Collection of high vaginal swab

The study participants were asked to lie in a lithotomic position to be able to expose the walls of the vaginal, and a sterile swab stick given was carefully inserted into the vagina and gently rotated around the posterior fornix to soak fluid into the sterile cotton bud.

Laboratory assay for Candida albicans

Sample analysis

Urinalysis and microscopy

Macroscopy

Urine samples were examined macroscopically for; color; if it is amber or straw-like or pale amber; appearance; if it is turbid or clear or cloudy; abnormal constituent; such as presence of blood. Urine biochemical dip strips were dipped into each of the urine samples and observed for colour changes which were matched with the standard colour chart.

Microscopy

5mls of urine of each participant were measured into a small centrifuge tube and were spun using a bucket centrifuge, the samples were spun at 3,000 rpm for 5minutes after which supernatant was decanted and sediments were placed on a clean greeze-free microscopic slides and covered properly with a cover slip and examined under the microscope at x10 and x40 of the light microscope.

Swab sticks containing participant's samples were examined microscopically by emulsifying it on a clean grease-free microscopic slide and cover slip and examined it at x10 and x40 of the light microscope.

Culture of specimens

Culture of urine and HVS

Sabouraud dextrose agar (SDA) was used for the isolation and cultivation of fungi species and yeast. The pH was approximately 5.6 in order to enhance the growth of fungi.

Urine and HVS specimens were inoculated into petri-dishes containing sabouraud media using sterile wire loops which were sterilized by using the blue flame of a Bunsen burner till the tip of the wire-loop becomes red-hot, allowed to cool and used to inoculate urine and HVS samples into various petri-dishes containing sabouraud dextrose agar and were incubated at 37˚c for 48hours and culture plate was examined for growth of candida species on Sabouraud dexrose agar [14].

Germ Tube Test

Germ tubes are short outgrowths, non-septate germinating hyphae. They are half the width and 3-4 times the length of the cell from which they arise. The germ tube appears as short lateral extension (septum) where it meets the yeast cell or any constriction at the septum along the tube. About 90% of yeast isolated from clinical materials are *Candida albicans* and the germ tube test provides a simple and reliable procedure for its identification. A small portion of an isolated colony of yeast from a culture plate was suspended in 0.5ml of human serum in test-tube, and was incubated at 37˚c for 2-3 hours. A drop of the yeast suspension was placed on a clean greeze-free microscopic glass slide and covered with a clean cover slip and examined at x10 and x40 of the light microscope for the presence of germ tubes. Only *Candida albicans* produced germ tubes within three hours.

Gram staining

Gram staining was used for identification of yeast cells.

A smear was made on a clean grease free microscopic glass- slide by emulsifying a colony from the culture plate in normal saline and was allowed to airdry properly, slide was taken to the staining rack and flooded with crystal violet for 1 minute, excess stain was rinsed off carefully, slide was flooded with lugol's iodine which is the mordant for 1 minute, stain was rinsed off carefully, the decolourizer (acetone) was added for 30 seconds and rinsed off, slide was flooded with the counter stain safranin for 1 minute and was carefully rinsed, slide was kept to properly air-dry and was examined using the oil immersion x100 objective lens of the microscope. A purple coloured (gram positive) oval shaped organism was observed under the microscope, indicative of yeast cells.

Quality assurance

Positive and negative controls were added to ensure accuracy.

Statistical analysis

Questionnaires were checked for completeness. The data was analyzed using Statistical Package for Social Sciences (SPSS). Prevalence was expressed in percentages. The association between risk factors and prevalence of *Candida* were tested using Pearson chi-square. Statistical significance was accepted at $p< 0.05$ (95% confidence interval).

3. Results

Table 1 shows the association between awareness parameters and prevalence of vulvo-vaginal candidiasis among the four sub-groups. The awareness parameters include; knowledge of STI, knowledge of *Candida* and sources of information. There was no association (p-value>0.05) between candidiasis and awareness parameters in urine and HVS.

Table 1. Association between Awareness Parameters and Prevalence of candidiasis among study groups

	Responses	**NE**		**NP(%)**									
				OP		**HIV**		**PTW**		**HVC**		**X2**	**P**	**X2**	**P**
AWARENESS		**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**		**HVS**	
Knowledge on STI	Yes	420	188	56(13)	30(15)	30(7)	36(19)	44(10)	31(16)	34(8)	37(19)	0.067	0.796	0.813	0. 367
	No	30	12	7(23)	4(33)	2(8)	2(16)	2(8)	4(33)	0(0)	0(0)				
knowledge on Candida	Yes	301	142	31(10)	15(10)	16(5)	24(16)	36(11)	27(19)	34(11)	37(26)	0.00	0.991	0.70	0.792
	No	149	58	32(21)	19(32)	16(10)	14(24)	10(6)	8(13)	0(0)	0(0)				
Source of information	Books	73	18	9(12)	7(38)	4(5.4)	2(11)	3(4.1)	0(0)	10(13)	0(0)	6.887	0.142	3.794	0.435
	Media	14	18	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	10(71)	11(61)				
	HCP	179	86	15(8)	8(44)	10(5)	18(20)	30(16)	21(24)	14(7)	20(23)				
	Fam/friends	35	12	7(20)	0(0)	2(5)	4(33)	3(8)	4(33)	0(0)	0(0)				
	NR	149	66	3(4)	19(28)	16(10)	14(21)	10(6)	10(15)	0(0)	6(9)				

NE= *Number examined* ***NP=*** *Number positive* ***OP=*** *out patients* ***HIV*** *= Hiv patients* ***PTW =*** *pregnant women* ***HVC=*** *Healthy volunteer* ***HVS****= high vagina swab****HCP=****Health care professional* ***NR=*** *No response* ***FAM*** *= Family*

Table 2 shows the association between hygiene parameters and prevalence of vulvo-vaginal candidiasis among the four sub-groups. The hygiene parameters include; washing hands, wash private parts, wash with, tight underwear, repeat underwear and clean after urination. There is association (p-value<0.05) between candidiasis and washing, wash private parts, wash with, tight underwear in HVS. There is association (p-value<0.05) between candidiasis and clean after urination hygiene parameter in urine but there was no association (p-value>0.05) between candidiasis and repeat underwear.

Table 2. Association between hygiene practice and candidiasis among the groups

	Responses	**NE**		**NP(%)**											
				OP		**HIV**		**PTW**		**HVC**		**X2**	**P**	**X2**	**P**
HYGIENE		**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**		**HVS**	
Wash hands	Reg	376	165	58(15)	30(18)	27(7.1)	38(23)	42(11)	33(20)	24(6.3)	13(7)	2.002	0.367	3.958	0.047
	Occ	73	35	4(6)	4(11)	5(6)	0(0)	4(5)	2(5)	10(19)	24(68)				
	Rarely	1	0	1(100)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)				
wash private parts	Reg	421	178	61(14)	34(19)	28(6)	30(16)	46(10)	35(19)	34(8)	34(19)	4.320	0.38	5.935	0.015
	Occ	29	22	2(6)	0(0)	4(13)	8(36)	0(0)	0(0)	0(0)	3(13)				
	Rarely	0	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)				
Wash with	Water only	424	186	53(12.5)	27(14)	30(7)	38(20)	46(10)	34(18)	34(8)	37(19)	0.630	0.730	11.215	0.004
	Water and soap	17	8	6(35.2)	1(12)	2(11)	0(0)	0(0)	1(12)	0(0)	0(0)				
	Water and antiseptic	9	6	4(44.4)	6(100)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)				
Tight underwear	Reg	65	19	13(20)	1(5)	8(12)	8(42)	0(0)	0(0)	4(6.2)	0(0)	2.2633	0.877	6.961	0.031
	Occ	120	58	18(15)	11(18)	14(11)	18(31)	5(4.1)	6(10.3)	12(10)	6(10)				
	Rarely	265	123	32(12)	22(17)	10(3)	12(9)	41(15.5)	29(23.5)	18(6)	31(25)				
Repeat underwear	Reg	33	5	10(30)	5(100)	3(9)	0(0)	0(0)	0(0)	2(6)	0(0)	1.544	0.649	9.493	0.09
	Occ	99	36	28(28)	13(36)	9(9)	4(11)	3(3)	2(5.5)	2(2)	0(0)				
	Rarely	318	159	25(7.8)	16(10)	20(6)	34(21)	43(13)	33(20.8)	30(9.4)	37(23)				
Clean after urination	Reg	390	167	61(15.6)	33(19.7)	27(6.9)	22(13.2)	45(11.5)	35(20.9)	30(7.7)	33(19)	10.41	0.005	2.048	0.359
	Occ	51	25	2(3.9)	1(4)	3(5.8)	10(40)	1(1.9)	0(0)	4(7.8)	4(16)				
	Rarely	9	8	0(0)	(0)	2(22)	6(75)	0(0)	0(0)	0(0)	0(0)				

NE= Number examined NP= Number positive OP= out patients HIV = Hiv patients PTW = pregnant women HVC= Healthy volunteer REG= Regularly OCC= Occassionally

Table 3 shows the association between lifestyle parameters and prevalence of vulvo-vaginal candidiasis among the four sub-groups. The lifestyle parameters include; sexually active, unprotected sex, protect self with, STI screening on partner and STI screening on self. There is association (p-value<0.05) between candidiasis and unprotected sex and STI screening of partner in HVS. There was no association (p-value>0.05) between candidiasis and sexually active, protect with and STI screening self in both urine and HVS.

Table 3: Association between lifestyle and candidiasis among the study groups

	Responses	NE		NP(%)											
				OP		HIV		PTW		HVC		X2	P	X2	P
LIFESTYLE		**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**	**HVS**	**Urine**		**HVS**	
Sexually active	Yes	384	182	57(14)	29(15)	32(8)	38(20)	46(11.9)	35(19.2)	20(5.2)	30(16.5)	2.399	0.121	0.279	0.597
	No	66	18	6(9.0)	5(27.8)	0(0)	0(0)	0(0)	0(0)	14(21)	7(38.9)				
Unprotected sex	Reg	237	110	27(11)	21(19)	20(8.4)	24(21.8)	43(18.1)	30(27.3)	4(1.6)	3(2.7)	2.727	0.436	16.189	0.001
	Occ	77	38	13(16)	2(5.3)	6(7)	8(21)	3(3.8)	5(13.2)	8(10.2)	21(55)				
	Rarely	70	34	17(24)	6(17)	6(8.5)	6(17.6)	0(0)	0(0)	8(11.4)	6(17)				
	NR	66	18	6 (9.0)	5(27.8)	0(0)	0(0)	0(0)	0(0)	14(21.2)	7(38)				
protect self with	Condoms	108	47	23(21)	7(14.9)	8(7.4)	10(21)	3(2.7)	5(10.6)	12(11.1)	12(25)	4.418	0.492	4.204	0.122
	medications	72	39	11(15)	3(7.7)	7(9.7)	10(25.6)	4(5.5)	2(5.1)	8(11.1)	18(46)				
	NR	270	114	29(10.7)	24(21)	17(6.2)	18(15.8)	39(14)	28(24)	14(5.1)	7(6.1)				
STI screening on partner	Reg	134	28	21(15.6)	2(7.1)	12(8.9)	8(28.6)	15(11)	7(25)	6(14.5)	10(35)	0.679	0.878	10.186	0.017
	Occ	100	20	14(14)	0(0)	7(7)	6(30)	10(10)	6(30)	10(10)	3(15)				
	Rarely	168	134	23(13)	27(20)	13(7.7)	24(17.9)	21(12.5)	22(16.4)	6(3.5)	17(12)				
	NR	48	18	5(10.4)	5(27)	0(0)	0(0)	0(0)	0(0)	12(25)	7(38.9)				
STI screening on self	Reg	74	68	9(12.2)	11(14.9)	7(9.5)	7(9.4)	9(12.2)	9(12.2)	6(8.1)	11(16)	2.216	0.529	1.015	0.789
	Occ	81	46	11(13)	5(10.8)	7(8.6)	13(28.3)	10(12)	7(17)	4(4.9)	14(30)				
	Rarely	230	86	37(16)	18(20)	18(7.8)	18(20.9)	27(11.7)	19(22)	10(4.3)	12(13)				
	NR	65	0	6(9.2)	0(0)	0(0)	0(0)	0(0)	0(0)	14(21.5)	0(0)				

NE= Number examined **NP=** Number positive **OP=** out patients **HIV** = Hiv patients **PTW =** pregnant women **HVC=** Healthy volunteer **REG**= Regularly **OCC**= Occassionally **NR**= No response.

4. Discussion

The prevalence of the infection among the sub-groups based on possible risk factors associated with awareness that can expose people to candidiasis was recorded. People who had not heard about STI had higher prevalence than those who knew about STI. Out patients (23%) in urine and (33%) prevalence in HVS were recorded in people who had no knowledge of STI. This could be as a result of lack of adequate knowledge about the infection. There was no connection between awareness of STI and candidiasis infection. Participants who responded NO to knowledge of candida also had a higher prevalence than those who had heard about the infection. (32%) prevalence of the infection was recorded in participants with no knowledge of candida infections which could be as a result poor enlightenment and knowledge about the infection. This result however is contrary to the work of Brocklehurst et al. [10], which reported the discoveries associated with negative pregnancy outcomes that come with candidiasis such as spontaneous abortion, preterm labor, premature birth,

preterm premature rupture of the membranes, amniotic fluid infection, postpartum endometritis, and postcesarean wound infection.

Hygiene practice is one of the possible risk factors that predispose one to Candidiasis. This research recorded that participants who washed their vagina with antiseptic had a higher prevalence of (44.4%) in outpatients, participants who also washed their vagina with soaps had prevalence of (35.2%) in out patients and this is because the normal acidic pH of the vagina makes it difficult for pathogenic bacteria or fungi to infect the vagina, but soaps, antiseptics, gels and other chemicals used for douching disrupts the normal flora (good bacteria) of the vagina and may cause an imbalance in the pH of the vagina which gives rise to pathogenic bacterial infections and opportunistic fungi infections such as Candiaisis. This study showed an association between washing the vagina with soap and anti-septic and prevalence of candidiasis infection. Also, people who wear air-tight underwear had a prevalence of (42.1%) this could be due to the change in temperature of the vagina when air-tight under-wear are worn for too long which could cause the overgrowth of candida species leading to vulvo- vaginal candidiasis. Air-tight underwear for a long time disrupts the normal temperature of the vagina and causes moisture or heat in the genital areas and makes it easier for yeast and bacterial infections to occur in the vagina, which agrees with a work carried out by Ahmad *et al*., [11]. This study proved that a relationship exists between wearing air-tight underwear and candidiasis.

Prevalence of candidacies based on risk factors associated with lifestyle showed that infection was quite higher in participants who have unprotected sex regularly. This could be as a result of transmission of the infection from an infected partner that may have oral candidiasis, the infection could also be transmitted during sex. There was a link showing the association of unprotected sex and prevalence candidiasis. This outcome is in agreement with work of Payne et al. [12], who reported that sexually active women are exposed to the bacterial vaginosis.

5. Conclusion

This study which was focused at determining the association between candidiasis and risk factors revealed that washing of private part, the substance used to wash it and wearing tight clothes have roles they play in the prevalence of candidiasis. Similarly, unprotected sex and STI screening of partner have impact of the prevalence of candidiasis in women attending RSUTH.

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