

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF ALLIED HEALTH SCIENCE
DEPARTMENT OF MEDICAL LABORATORY SCINECES**



PREVALENCE OF VULVOVAGINAL CANDIDIASIS AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE UNIT AT YEKATIT 12 HOSPITAL, ADDIS ABABA, ETHIOPIA, 2018

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List of Abbreviations

AAHB	Addis Ababa Health Bureau
AAU	Addis Ababa University
BHI	Brain Heart Infusion
BV	Bacteria Vaginosis
CDC	Communicable Disease Control and Prevention
CI	Confidence Interval
CSA	Central Statistics Agency
DMLT	Department of Medical Laboratory Technology
EPHI	Ethiopia public and health institution
ETB	Ethiopian Birr
FGT	Female Genital Tract
FMOH	Ethiopian Federal Ministry of Health
HIV	Human Deficiency Virus
OR	Odds Ratio
QC	Quality Control
RTI	Reproductive Tract Infections
SDA	Subordinet Dextrose Agar
SOPs	Standard Operating Procedures
STD	Sexually Transmitted Disease
Y12H	Yekatit 12 Hospital
V VC	Vulovaginal Candidasis
WHO	World Health Organization

Operational definitions

Bacterial vaginosis: Which is characterized by a reduction in the numbers of lactobacilli and an increase in the concentration of Gardnerella vaginalis and resident anaerobic bacteria, which is diagnosis by Nugent score method.

Vaginitis: A condition involves inflammation of the vulva and vaginal wall due to bacteria vaginosis and vulva candidiasis

Pathogenic bacteria: are bacteria that can cause disease.

Abstract

Introduction: Vulvovaginal candidiasis is an infection caused by a number of pathogens in the Genus *Candida*. It is a very common disease of women of reproductive age all over the world. Among the many causes of vaginitis Vulvovaginal candidiasis is the second most common after bacterial vaginosis. It is estimated that around 75% of all women experience at least one episode of VVC during their childbearing years, of whom about half have at least one recurrence.

Objective: To assess the prevalence of vaginal candidiasis and associated factors among pregnant women attending Antenatal Care Unit(ANC) at Yekatit12 Hospital, Addis Ababa, 2018.

Methods and materials: A cross-sectional prospective study was conducted on 422 pregnant women attending Antenatal Care Unit (ANC) at Yekatit12 Hospital, Addis Ababa, Ethiopia between January to April 2017. Socio-demographic data were collected using structured questionnaire from consented patients. Vaginal swab specimens were collected and processed as per standard procedures in appropriate culture media like the one Sabouraud Dextrose Agar (SDA) supplemented with chloramphenicol (Oxoid, Basingstoke, UK). The data were analyzed by using SPSS version 20. Appropriate statistical tools were used to explore the data.

Result: The overall vaginal infection was 36% The study shows that pruritus ($p=0.000$) dysuria(0.000), lower abdominal pain($p=0.000$) and vaginal discharge ($p=0.000$) as a key symptom and highly significant to VVC in the contrast Risk factors considered for VVC in this study were not significant in both univariate and multivariate analysis ($P>0.05$).

Conclusion: The prevalence of vaginal infections was high (36%) among pregnant women in Yekatit 12 Hospital Antenatal clinic attendants during the study period. The study also shows that pruritus dysuria, lower abdominal pain and vaginal discharge as a key symptom in VVC infection.

Keywords: Prevalence, candidiasis, Antenatal ,

1. Introduction

1.1 Background

Vulvovaginal candidiasis (VVC) is a common type of vaginitis that manifests with an odorless curdy white discharge in the female lower reproductive tracts with pruritus, irritation, dysuria or dyspareunia[1,2]. It is a common complaint among women of different age groups in any society whether or not they are sexually active. Some studies have shown high preponderance of vaginal candidiasis in infective Vulvovaginal discharge among which studies included 52.5 and 60% isolation rate respectively, of *Candida* species[3].

Risk factors for vaginal candidiasis are factors that do not seem to be a direct cause of the disease, but seem to be associated in some way. Having a risk factor for VC makes the chances of getting a condition higher but does not always lead to vaginal candidiasis[4]. Also, the absence of any risk factor or having a protective factor does not necessarily guard one against getting vaginal candidiasis. Some risk factors for VC include pregnancy, poorly controlled diabetes, oral contraceptive, antibiotics, immune suppression, douches, perfumed feminine hygiene sprays, topical antimicrobial agents, tight clothing, tight under wears, thyroid disorders and corticosteroid [5].

Vulvo-vaginal candidiasis is caused by the fungus *Candida albicans* in approximately 85% of cases, while other species such as *Candida glabrata*, *Candida krusei*, *Candida tropicalis* and *Candida stellatoide* rarely cause vaginitis [6]. Changes in the vaginal environment are usually necessary before the organism can induce pathological effects.

Although VVC is both treatable and mild, when left untreated, is a possible risk for acquisition of HIV/AIDS as well as other complications [7]. Other complications include pelvic inflammatory disease, infertility, ectopic pregnancy, pelvic abscess, menstrual disorders, spontaneous abortion and premature birth. It is now well established that the presence of infective vaginal discharge greatly facilitates transmission and acquisition of HIV between sexual partners [8].

Therefore, there is a need for prevention, early diagnosis and prompt treatment of this common condition especially among the risk groups, in order to avert the complications and reduce the transmission of HIV. Although bacterial Vulvovaginal candidiasis is associated with numerous health problems and a major global concern, it has neither been the focus of intensive study nor of active control programs in Ethiopia. Therefore, the purpose of the present study is to determine the prevalence of vulvovaginal candidiasis and associated risk factors among women attending gynecology and antenatal clinic.

1.2 Statement of the problem

Along with bacterial vaginosis, vulvovaginal candidiasis is the most common cause of vaginitis, and hence among the commonest reasons for women to seek medical help. In recent years, vulvovaginal candidiasis further emerged as a global issue of concern due to its association with ascending genital tract infection and with sexually transmitted infections. It has been propagated that ascending genital tract infection with vulvovaginal candidiasis related pathogens has been associated with postabortion and postpartum endometritis, pelvic inflammatory disease (PID) and during pregnancy, late foetal loss and spontaneous preterm birth. Furthermore, vulvovaginal candidiasis renders women particularly vulnerable to the acquisition of *Trichomona svaginalis*, *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, HSV-2 and HIV-1. Moreover, it has been documented that vulvovaginal candidiasis propagates viral replication and vaginal shedding of the HIV-1 and HSV-2 viruses, thereby further enhancing the spread of these viruses [9]. Failure to control the high prevalence of vulvovaginal candidiasis has now become a global issue of concern. Hence, determining the prevalence of vulvovaginal Candidiasis and associated factors among pregnant women attending ANC is one of the highest priorities at Yekatit 12 Hospital.

1.3. Significance of the study

Firstly, the result of this study help the policy makers and other responsible body to plan necessary training program based on the result for health professionals which helps them to improve their knowledge regarding the problem.

Secondly, it will help to create awareness to the community because based on the result finding, health professionals give health education to mothers about different risk factors at the time of ANC follow up which help them to screened and treated early.

Thirdly, it was a baseline for other researcher to do prospective study for the future because it assesses the current event.

Fourthly, the results of this study will provide insight to health care provider in identification of early diagnosis and management of vulvovaginal Candidiasis.

2. Literature Review

A study conducted on prevalence of vulvovaginal Candidiasis in Southeastern America by Charles, *et al.*, 2011 [10], showed that a prevalence of Vulvovaginal candidiasis was 15.7% . The prevalence of BV/vulvovaginal candidiasis mixed infections among young women was observed to be 4.4%.

Vulvovaginal candidiasis is an infection caused by a number of pathogens in the Genus *Candida*. These species are VulvovaginalCandidiasisAlbicans(accounting for about 80 to 90%), *candida glabrata* (10%), *Candida tropicalis*, *Candida krusei* and *Candida parapsilosis*[11].The infection is characterized by a curd-like discharge, itching and erythema. Vaginal candida colonization is known to increase during pregnancy. The reason for this is thought to be due to increased oestrogen levels, glycogen and other substrates in the vagina . Increased level of *Candida spp* may cause an imbalance in normal flora of the vaginal, thereby decreasing lactobacillus dominance[12-13].

The infection is very prevalent in women and especially pregnant women are more at risk. Even though *Candida spp* causes Vulvovaginal candidiasis, it is asymptomatic in about 20 to 30% of women and part of their normal flora. Approximately, 75% of healthy women develop VVC at least once during their reproductive age [14].

There are studies from India and Nigeria have shown VVC infection range between 10.0% to 55.0% [15-17].

A prospective study was performed involving 65 women who consecutively attended Gynecological ward in Maternity and Child Hospital in Ramadi for complaints of genital malodor and/or abnormal vaginal discharge by Huda R,et al.2008 period Bacterial vaginosis was diagnosed in 30 (46.2%) women, vulvovaginal yeast fungi infection in 12 (18.5%) women, other aetiology in 16 (24.6%) and in Seven (10.8%) women showing sterile vaginal discharge[18].Another study here in Iraqi by Waleed I. et al reported a prevalence of 38% VulvovaginalCandidiasisinfection in 50% of women complaining of vaginal discharge and 15% of diabetic women without vaginal discharge [19].

Similar study conducted by Ibrahim SA .et al., 2009 in Nigeria found that Vulvovaginal Candidiasis infection is the commonest cause of pathologic vaginal discharge and it is common in the unmarried and in those within the reproductive age group [20]. Another study in South-Eastern Nigeria showed that women within the age range 31-35 had the highest prevalence of *T. vaginalis* (36.00%) while those within 36-40 years and 26-30 years had the highest prevalence of *C. albicans* (33.33%) and co-infections (43.00%) respectively. Women

within their 3rd trimesters of pregnancy had the highest prevalence of 30.40% and 32.41% respectively for *T. vaginalis* and *C. albicans*, while those in their 2nd trimester had the highest prevalence in co-infections (30%)[21]. similar study conducted in Kenya Thika District Hospital by Menza N. et al exhibited the percentage distribution of vaginal candidiasis within age group was highest in the age range 26 - 35 years with 56(60%) patients and in the 3rd trimester of pregnancy with 64(68.09%) patients[22].

A study conducted by C Uneke. et al in Nigerian on non gonococcal and non Chlamydia microbial isolates from high vaginal swabs showed that the individual aged 30-40 significantly more infected with bacteria and *c. albicans*[23].

In neighbouring African countries, Burkina Faso reported a very low prevalence rate of 6.3% [24] while in Nigeria a much higher rate of 81.5 was reported in a university hospital[25].

In Ghana, a study among female sex workers in 2000 reported a rate of 24.4% [26]. Apea-Kubi et al., recorded a rate of 34.2% in pregnant women antenatal and gynaecological patients in Ghana [27].

Several authors have demonstrated that pregnancy [28-30] and antibiotic treatment [31] key risk factors for candidiasis. In a study by de Leon et al, 2002, candida carriage was associated with recent antibiotic use ($p = 0.03$), lifetime history of chlamydia ($p = 0.04$), and having oral sex during the past 2 weeks ($p = 0.08$). A study by Eckert et al., 1998 attributed risk factor for *C. albicans* isolation to condom use, sex frequency greater than four times a month, recent antibiotic use, young age, past infection with *Neisseria gonorrhoeae*. Other risk factors known to increase the VVC are oral contraceptive use, vaginal douching, tight-fitting clothing, synthetic underwear and increase sexual activities[32-33]. Some studies have reported HIV infection to be a risk factor to getting VVC [34-36]. The mechanisms by which pregnancy encourages *Candida* colonization are complex. During pregnancy, levels of both progesterone and estrogen hormones are elevated. Progesterone has suppressive effects on the anti-*Candida* activity of neutrophils, [37]. while estrogen have been found to reduce the ability of vaginal epithelial cells to inhibit the growth of *Candida albicans* and also decreases immunoglobins in vaginal secretions resulting in increased vulnerability of pregnant women to vaginal Candidiasis. [38-39]. Several additional factors like gestational diabetes[40]., frequent antibiotic therapy[41]., HIV status[42]., The principal symptoms of VVC are vulvar and/or vaginal pruritus and a thick curd/cheese like vaginal discharge[43]. However, painful urination and/or dyspareunia are also common. [44]. Cross sectional study in Baghdad Al-Yermouk Teaching Hospital, in 2011 showed that the study indicated that vaginitis is more

common in pregnant women (in first and second trimesters) than in non-pregnant one as a result of many factors such as hormonal factors and low socioeconomic status [45].

Studies in clinical settings in Bangladesh and India, reported that only 30 and 60% of women complaining of vaginal discharge had a laboratory confirmed RTI[46].

Another cross-sectional study carried out in Iran Turk in 2014 assessed the Prevalence of genital tract infections in pregnant women .Vulvovaginal Candidiasis(35.76%), Escherichia coli (17.97%), and Streptococcus (13.06%) were the most observed infections, with a higher prevalence rate of reproductive tract infections during the second half of pregnancy compared to the first half[47].

Further study among African women wearing tight clothes reported a higher prevalence of Vulvovaginal Candidiasis than those wearing loose clothing. Where regular users of tight clothings had 88.2% of Vulvovaginal Candidiasis and occasional and non wearers had 68.6% of Candida albicans[48]. Similar study conducted in Nigeria by U. P. Akpan et al. showed that a high incidence of vulvovaginal candidiasis (76.8%) with its associated symptoms were observed among women who regularly wore nylon tight and other synthetic pants than those who regularly wore cotton tight/cotton underwear/pants(42.9%). It can be concluded that women who predominantly wear nylon tight and other synthetic underwear/pants are at a higher risk of vulvovaginal candidacies [49].

3. Objectives

3.1 General objective

- ❖ To assess the magnitude of Vulvovaginal candidiasis and associated factors among pregnant women attending Antenatal Care Unit(ANC) at Yekatit12 Hospital, Addis Ababa, 2018.

3.2 Specific objectives

- ❖ To determine the prevalence of Vulvovaginal candidiasis among pregnant women attending Antenatal Care Unit (ANC).
- ❖ To identify factors associated with Vulvovaginal candidiasis among pregnant women attending ANC.

4. Methods and Materials

4.1 Study area and period

An institution based cross-sectional study was conducted from January to March; 2017. The study area was Addis Ababa city Administration and the capital city of Ethiopia. The study hospital was located in Addis Ababa, the capital of Ethiopia. The study site was Yekatit 12 Hospital (Y12H). The Y12H serves as a referral centre for all medical conditions from the surrounding hospitals, health centre and clinics from all region. The hospital has an Out-Patient-Department, an In-patient ward, an emergency unit, a theater, an ANC and a laboratory. The laboratory is well equipped to handle blood, urine and stool samples. It has a hematology, biochemistry and microbiology units.

The hospital has 1014 clinical and non-clinical staff members that provide medical specialty services.

4.2 Study Design

Prospective cross sectional study was conducted from January to March 2017.

4.3 Population

4.3.1 Source population

The source population was all pregnant women attending ANC at Yekatit 12 Hospital.

4.3.2 Study population

The study population was all pregnant women attending ANC who full fill the inclusion criteria.

4.4 Sample Size and Sampling Technique

A consecutive sampling technique was used. All pregnant women attending ANC were included in the study until the required sample size was obtained. Since the study was based on a single population proportion, the sample was calculated as follows;

$$n = \frac{Z_{1-\alpha/2}^2 P(1-P)}{d^2}$$

Where;

N is the sample size to be determined, $Z_{\alpha/2}$ is 1.96

Sample size was determined using single population proportion formula with inputs of 95% confidence level, 5% margin of error, 50% expected prevalence of vaginal candidia albicans and 10% non-response rate.

Thus the sample size is, $n = 384$

Where: n = Sample size, p = prevalence of Vulvovaginal candidiasis (50%), $q = (1-p)$, z = critical value 1.96, w = precision (marginal error) = 5%.

By taking non-response rate of 10%, the final sample size is **422**.

4.5 Study variables

4.5.1 Dependent Variables

Vulovaginal candidiasis (Yes/No)

4.5.2 Independent Variables

Socio demographic factors :age, religion, residence, marital status, educational and occupational status, pregnancy, history of abortion, oral contraceptive use, use of broad spectrum antibiotics, life time number of sexual partners.

4.5.3 Inclusion criteria

1. Pregnant women of any gestational age attending Antenatal Care Unit at Yekatit 12 Hospital.
2. Pregnant women who give consent and completed the informed consent form.

4.5.4 Exclusion criteria

1. Pregnant women with pregnancy complications such as prolong rupture of membrane etc.
2. Critically ill client.

4.6 Data Collection and Processing

4.6.1 Data collection

Data were obtained using pre –designed structural questionnaire by nurses ,supervision and principal investigator and Vaginal swab was collected to identify vulovaginal candidiasis. Before actual data collection, questionnaires was pre-tested by taking 22 pregnant women attending ANC at Yekatit 12 Hospital Other than the actual study participant's.

4.6.2 Sample processing

According to the Hospital report, around 1500 pregnant women have been enrolled to ANC and on average, 40-50 pregnant women visit ANC daily. Since the sample size is determined as 422, to avoid double enumeration the client card number was used and after data were collected code was given to the client card.

4.6.3 Sample collection

Upon admission to the study, physicians performed Clinical examination of each participant and recorded signs of vaginal abnormalities. During the examination, vaginal specimens were collected aseptically from study participants using sterile rayon tipped applicator stick swabs with experienced nurses.

Vaginal swabs were transferred to tubes containing sterile physiological saline and taken to the department of medical laboratory sciences, Addis Ababa University for Identification.

4.6.4 Culturing and identification of yeasts

Vaginal swabs collected from patients were inoculated onto Sabouraud Dextrose Agar (SDA) supplemented with chloramphenicol (Oxoid, Basingstoke, UK) and was incubated at 35–37°C for 18 to 24 hours aerobically. Plates with no growth after 24 hours were re-incubated for a further 24 hours. Preparation and performance evaluation of culture media were done as per the instruction of the manufacturer.

Yeasts were identified by employing conventional biochemical and assimilation test procedures using CHROMagar *Candida* culture medium (Becton Dickinson) as per the instruction of the manufacture, germ-tube formation in human serum.

4.6.5 Data Processing and Analysis

All questionnaires were double entered using MS-access software (Microsoft Corporation Copyright 2007) and checked for consistencies coded; double entered in EPI INFO to computer, processed, edited, and During analysis frequencies of the different variables were determined by using appropriate statistical tools. Data were analyzed using SPSS version 20 (Statistical Package for social sciences, SPSS) statistical software for analysis. All categorical variables were summarized as proportions whilst continuous variables were summarized as means or median based on the distribution of the variables. Associations between categorical variables were explained using the chi-square tests. Bivariate and multivariable logistic regression analysis was used to assess the relative effect of various explanatory variables on the dependent variable and to control potential confounders. P value ≤ 0.05 at 95% CI was considered statistically significant.

4.6.6 Data Quality Assurance

The questionnaire was prepared first in English and translated into the local language (Amharic). The translated Amharic version was pre-tested on pregnant women in the study Hospital prior to the actual survey and modifications were made accordingly. Training was given for data collectors and supervisor to have consensus and the same understanding of what is intended to be measured by each question in the questionnaire. The questioner was assessed before the actual data collection. Every activity in the laboratory was done by adherence with standard operation Procedures. The specimen was kept free of contamination. All materials, equipment and procedures were adequately controlled. Culture media were tested for sterility and performance. The performance of equipments (autoclave, incubators)

was monitored by using standard procedures. The data were checked for completeness and representativeness prior to entry.

4.6.7 Ethical consideration

Before starting the research work, ethical clearance was obtained from the Departmental Research and Ethics Review Committee (DRERC) of Addis Ababa University College of Health Sciences, School of Allied Health Sciences, and Department of Laboratory Sciences. Then a letter informing to Yekatit 12 Hospital about the study was written from ethical Committee of department of Medical Laboratory and permission was obtained from Yekatit 12 Hospital to access data from study population. All eligible subjects were informed as their participation was voluntary and as the aim of this study was only to collect necessary information which was helpful to assess prevalence of Vulovaginal Candidasis among pregnant women attending ANC. All the information obtained from the study subjects were coded to maintain confidentially.

Dissemination of results

After conducting the research, the results of the study was submitted to Addis Ababa University, College of Health Sciences, School of Allied Health Sciences, and Department of Laboratory Sciences. So it can serve as a reference in the library. In addition, a copy of this material was given to Addis Ababa Health Bearua Yekatit 12 Hospital ,annual conferences of professional societies and other concerned bodies. The finding of the study was presented to the medical scientific community and manuscript will be submitted to peer reviewed journals for publication.

5. RESULTS

5.1 Distribution of sociodemographic characteristics of study population

The age of the pregnant women ranged from 15 to 44 years. Age group with the highest number of women was 25-34 (61.6%, 260/422) while the least was 35 and above (13%, 55/422). Among the 422 pregnant women interviewed, more than half 93.10% (393/422) were married. There were 4% (17/422) single women while 2.8% (12/422) were Divorced . Majority of the participants 57.1% (241/422) were unemployed. (Skilled, unskilled or professional work) while the minority 42.9% (181/422) were employed Out of 422 pregnant women enrolled (42.5%, 178/422) had completed elementary education (Defined as having completed primary or Junior Secondary school). (26.8%,113.0/422) reported having had secondary education (defined as having completed senior secondary/technical/Vocational/Commercial school) while about quarter (26.1%,110 /422) had completed elementary education and about(5%,21/422) had no formal education.

Parameters	Frequency (%)
Age in years	
15-24	107(25.36)
25-34	260(61.6)
35-44	55(13.03)
Marital Status	
Married	393(93.1)
Single	17(4)
Divorced	12(2.8)
Occupation	
Employed	181(42.9)
Unemployed	241(57.1)
Education	
Informal	21(5)
Primary	178(42.5)
Secondary	113(26.8)
College	110(26.1)

Table 1: Distribution of sociodemographic characteristics of study population

5.2 Distribution of clinical presentations, Behavioral , Risk factors and obstetrics of vulvovaginal candidiasis in the study population

The reported vaginal symptoms were vaginal discharge (35.3%, 149/422), vulva itching (24.4%, 103/422) and lower abdominal pains (27.7%, 117/422). The rest was dysuria (irritation) (18.9%,80/422). Twenty-six (4.41%, 26/589) had taken antibiotic within three weeks prior to enrolments while 563 (95.59%, 563/589) had not taken any antibiotics within the past three weeks. More of the pregnant women in the study were in their second and third trimester (43.4%, 183/422) (45.0%, 190/422) of their pregnancy respectively. The first trimester (11.6%, 49/422) recorded the least number of pregnant women.

Parameters	Frequency (%)
Presenting clinical features	
Lower abdominal pain	117(27.7)
Vaginal discharge	149(35.3)
Vaginal itching	103(24.4)
Vaginal irritation	80(18.9)
Recent Antibiotic use by the mother	
Yes	78(18.5)
No	344(81.5)
Age of the pregnancy	
First Trimester	49(11.60)
Second Trimester	183(43.4)
Third Trimester	190(45)
History of abortion	
Yes	137(32.5)
No	285(67.5)
Life time sex partner	
One	288(68.3)
Two	112(26.5)
More than two	22(5.2)
HIV Status	
Yes	7(1.65)
No	415(98.3)

Table 2. Distribution of clinical presentations, Behavioral , Risk factors and obstetrics of vulvovaginal candidiasis in the study population

Total Prevalence of vulvovaginal candidiasis among pregnant women attending antenatal clinic Yekatit 12 Hospital was 36%.

5.3 Laboratory findings

Laboratory findings	Frequency(%)
Negative	270(64)
c.albicans	94(22.3)
c.kurisi	31(7.3)
other candidas	27(6.4)
Total	100(100%)

Table 3: Laboratory findings

5.4 The association between VVC and symptoms/sign

In univariate analysis of the association of VVC with vaginal symptoms, vaginal discharge, lower abdominal pain, pruritus and dysuria were all independently significantly associated with the infection.

In multivariate analysis, adjusting for possible confounding relationship (pruritus, vaginal discharge, lower abdominal pain and dysuria), pruritus still remained significantly associated with VVC.

symptom	Total N	VVC n (%)	OR (Unadjusted)	P-value for OR	AOR (Adjusted)	P-value for AOR
Lower abdominal Pain						
Yes	117	35(23)	2.349 (1.381-3.994)	.002	2.359(1.388-4.011)	.002
No	305	117(77)				
Discharge						
Yes	149	78(51.3)	.389 (.245-.618)	.000	.388(.245-.616)	.000
No	273	74(48.7)				
Itching						
Yes	103	66(43.4)	.263 (.151-.458)	.000	.259(.149-.451)	.000
No	319	86(56.6)				
Irritation						
Yes	80	45(29.6)	.696(.373-1.296)	.253	.711(.383-1.320)	.280
No	342	107(70.4)				

COR=Crude odd ratio, AOR=Adjusted odd ratio, P-value

Table 4:The association between VVC and symptoms/sign

5.5 Risk factors for VVC

Univariate and multivariate analysis shows that age group, trimester of pregnancy, recent antibiotic use and sex frequency were not risk factors for acquiring VVC.

Characteristics	Total	Candidiasis positive (%)	Candidiasis Negative(%)	OR (Unadjusted)	P-value for OR	AOR (Adjusted)	P-value for AOR
Age group							
15-24	107	44(41.1)	63(58.9)	1.222(.625-2.391)	0.419	0.818(0.418-1.6)	0.558
25-34	260	88(33.8)	172(66.2)	.895(.488-1.642)	0.558	1.117(0.609=2.048)	0.721
35-44	55	20(36.4)	35(63.6)		0.721		
Trimester							
First trimester	49	17(11.2)	32(11.9)			1.004(.462-2.181)	0.991
Second trimester	183	56(36.8%)	127(47%)			1.634(.999-2.673)	0.051
third trimester	190	79(52%)	111(41.1)				
Antibiotic use							
Yes	78	34(22.4%)	44(16.3)			.723(.398-1.313)	0.287
No	344	118(77.6%)	226(83.7%)				
Marital status							
Single	17	7(4.6%)	10(3.7%)			.339(.074-1.553)	0.163
Married	393	142(93.4%)	251(93)			.282(.044-1.785)	0.179
Divorced	12	3(2%)	9(3.3)				
Education							
informal	21	6(3.9%)	15(5.6)			1.725 (.512 -5.811)	0.379
primary	178	70(46.1%)	108(40)			.936 (.500-1.750)	0.835
Secondary	113	38(25%)	75(27.8)			1.156 (.585-2.287)	0.677
college	110	38(25%)	72(26.7)				
Number of life time male sex partner							
one	288	108(71.1%)	180(66.7%)			.433 (.134-1.400)	0.162
two	112	39(25.7%)	73(27%)			.567 (.166-1.928)	0.363
more than two	22	5(3.3%)	17(6.3%)				
History of abortion							
yes	137	41(27%)	96(35.6%)			1.416 (.846 -2.369)	0.186
No	285	111(73%)	174(64.4%)				
HIV Status							
Yes	7	6(3.9%)	1(0.4%)			.065 (.007-.613)	0.017
No	415	146(96.1%)	269(99.6)				

COR=Crude odd ratio, AOR=Adjusted odd ratio, P-value(AOR)= P-value by AO

Table 5. Risk factors for VVC

6. Discussion

VVC had the highest vaginal infection prevalence rate of 36 % in this study. The reported rate compares well with 36.0% in Nigeria, 34.2% in Accra, 37.4% in Turkey [50,23,13] However, in some other studies in pregnant women, the present study prevalence was slightly higher than 24.4% and 30% in Nigeria [51,15].

In another related study in only asymptomatic pregnant women in the United Kingdom, *Candida spp* prevalence was 12.5% as compared to 36.5% in this study [52]. This disparity in the prevalence might be due to the fact that only asymptomatic patients were included in the study. This might have affected their prevalence and would have been much higher.

Even though, the study recorded very high prevalence 36% for VVC, it was lower than finding reported by Limia et al at 42.3% using Immunologic Latex Agglutination Test [53]. Another study in two hundred (200) women reported a much higher rate of 81.5% in patients attending a Medical Centre in Nigeria [54].

The high *Candida spp* colonization of the study participants' vagina might be because of their pregnancy status. This is due to the high concentration of oestrogen hormone during pregnancy which provides favourable environment for the growth of *Candida spp* [55] Nonetheless, this high rate calls for urgent attention to the infection since it causes a lot of discomfort to the pregnant woman who is already experiencing some level of discomfort. Moreover, the mother could infect the baby during perinatal period. In addition VVC could be an indication of an underlying infection such as diabetes mellitus.

Furthermore, recent emerging evidence suggests that screening for and eradication of candida during pregnancy may reduce the risk of preterm delivery (56,57). Further studies needs to be carried to confirm these findings.

In both univariate and multivariate analysis for VVC and vaginal symptoms pruritus, dysuria, lower abdominal pain and vaginal discharge were symptoms Highly significantly associated. This finding is not consistent with a study in India, where the only pruritus was the most common symptom to VVC with or without vaginal discharge[58], (Eckert et al.,1998) study found significant association between VVC and pruritus or burning[30].

The study assessed the risk factors for the vaginal infections VVC using age groups, trimester, Abortion, educational status, and recent antibiotic use.

After adjusting for other confounding variable, the HIV positive status of pregnancy was shown to be protective for VVC ($p=0.017$) and having had third trimester pregnancies also found to be protective for VVC ($p=0.051$). The protective nature in

third trimester might be due to the physical nature of the pregnant women, which makes her sexually unattractive to the opposite sex thereby reducing multiple sexual partners and sex frequency, which are the main determinant of vaginal infections. In addition, health education and care during antenatal visit could prevent the pregnant women from vaginal infections.

In addition, health education provided during antenatal visits coupled with personal experiences in previous pregnancies might give those with three or more pregnancies better knowledge and experience concerning vaginal infections. Women with less than three pregnancies are less likely to have such education and experiences making them more prone to vaginal infections.

Risk factors considered for VVC in this study was not significant in both univariate and multivariate analysis ($P > 0.05$). Studies have shown recent antibiotic intake and HIV have a positive correlation to VVC [57]. This negative correlation between antibiotic use and VVC in the present study could be because of the low level of intake of antibiotic by the study participants.

7. Limitations of the study

1. Some yeast are not identify up to species level.
2. The risk factors used for the analysis were self-report by study participants; there is the possibility of underreporting or misclassification of risky behavior.

8. Conclusion

The study area had very high prevalence of vaginal infections among pregnant women especially VVC. VVC was the most predominant (36%, 152/422) vaginal infection.

The study shows that pruritus dysuria, lower abdominal pain and vaginal discharge as a key symptom in VVC infection.

9. Recommendation

In view of the high prevalence of vaginal infections, pregnant women attending antenatal clinic should have prompt and adequate investigations with appropriate treatment to prevent adverse effect of the infection on mother and fetus.

In addition, a comprehensive program on reproductive healthcare education with the aim of reducing vaginal infection prevalence should be put in place.

Further studies are needed to understand the potential role of VVC infection affects the mother and fetus needs to be unraveled. Therefore, I recommend further longitudinal and follow-up studies to investigate the effect of the infection.

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11. Annexes

Annex I: English Versions of Participant Information Sheet

Title of the Research

Prevalence of Vaginal candidiasis and associated factors among pregnant women at Yekatit 12 Hospital, Addis Ababa.

Principal investigator: BrutawitAmdemariam (BSc)

Advisor: 1.Adane Bitew (PHD)

Name of the Organization: School of Medical Laboratory Technology, Addis Ababa University

Introduction

My name is _____ and I am student at Addis Ababa University for master`s degree .I am doing a research on pregnant women as a part of my study course. I am going to give you information and invite you to be part of this research. Before you decide to be part of the research you can talk to anyone you feel comfortable with about the research. If there is any word that you don`t understand while I am giving information, please stop me and ask me I will explain to you.

Purpose of the research

The aim of this research is to investigate prevalence of vaginal candidiaalbicans and associated factors among pregnant women.Many literatures in various parts of the world including Ethiopia state that most pregnant women had Vulovaginal candidiasis and various factors influence vaginal candidiasis; also it is believed that it affects health and wellbeing of the mother and fetus to result in life threatening condition.Therefore this study tries to identify those factors that influence vaginal candidiasis of pregnant women and look for solution to the problem.

Duration: the duration of this study will be for 15 minutes.

Procedures

If you are willing to participate in the study, you will be asked to sign a consent form and the following procedures will be done.

- ✓ You will provide us a 10 minutes interview
- ✓ Your medical history will be reviewed
- ✓ We will take vaginal swab (one swab)

Voluntary participation

Your participation in this research is entirely voluntarily. It is your choice whether to participate or not. Refusing to participate will not avoid you from receiving any kind of health service. You may change your mind later and you have also the full right to withdraw from this study at any time you wish.

Confidentiality

The information that collected for this research will be kept confidential. Information about you that is collected during the research will be put away and no one but the researcher will be able to see it. Any information about you will have number (code) on it instead of your name .The researcher keep the information secret that no one else can access, see or know it. It will not be shared with anyone.

Benefits

Your participation in this research may not directly give you a certain benefit as an individual. You will not be provided any incentives or payment to take part in this research. Your participation will help us to know whether there is vaginal candidiasis or not. Therefore, if there is, vaginal Vulvovaginal Candidiasis will help to develop better intervention methods to control it.

Risk and /or Discomfort

By participating in this research you will not face any health problem other than a slight discomfort especially during giving sample.

Communication

In case if you have any questions, unclear ideas and doubt about the project, contact addresses are:

Investigator: BrutawitAmdemariam (BSc), DMLS; AAU, +251911720384

Email- Brutatt@gmail.com

Advisor: AdaneBitew (PhD), DMLT, AAU +251911039162

For additional information, please contact Addis Ababa University, College of Health Sciences, Department of Medical Laboratory Sciences at: Telephone +251112755170

Annex II: English Versions of Consent form

This page contains an agreement signature to participate in the study entitled with “Prevalence of Vaginal candidiasis and associated factors among pregnant women at Yekatit 12 Hospital, Addis Ababa.”So please read the following points and sign your signature at the end in the space provided.

1. I understand the objective of the study “Prevalence of Vaginal candidiasis and associated factors among pregnant women at Yekatit 12 Hospital, Addis Ababa,Ethiopia.”

2. I know that the information/ specimen that I will give used for this study only.
3. I understand that, all the information given for the study and the results are confidential.
4. I understand that I will not get any money for my participation.
5. I understand that I have a right to stop from participation any time in the study.
6. I understand all the information which is explained by specimen collector/Nurse.

Signature of the participant: _____

Address of the participant: _____

Date: _____

Please direct any questions or problems you may encounter during this study to:

BrutawitAmdemariam

Department of Medical Laboratory Sciences, College of Health Sciences

Addis Ababa University

Mobile +251911720384

Email- Brutatt@gmail.com

For additional information, please contact Addis Ababa University, College of Health Sciences,

Department of Medical Laboratory Sciences at: Telephone +251112755170

Annex III: Amharic Versions of Participant Information Sheet

እኔ፡ ቡሩታዊት፡ አምደማርያም፡ እባላለሁ፡፡ በአዲስ፡ አበባዩኒቨርሲቲ፡ ጤና ሳይንስ ኮሌጅ፡ የህክምና ላቦራቶሪ፡ ሳይንስ፡ ትምህርት፡ ክፍል፡ የሁለተኛ፡ ዲግሪ፡ ተማሪ፡ ስሆን፡ የምርምር፡ ስራ፡ ላይ፡ መስራት፡ ላይ፡ እገኛለሁ፡፡ በመሆኑም፡ እርስዎም፡ በዚህ፡ ጥናት፡ ላይ፡ እንዲሳተፉ፡ ተጋብዘዋል፡፡ በጥናት፡ ለመሳተፍ፡ ፈቃደኛ፡ ሆነዉ፡ ከተስማሙ፡ መስማማትዎን፡ የሚያሳይ፡ ደክመንት፡ ላይ፡ እንዲፈረሙ፡ እጠይቃለሁ፡፡

መግቢያ

የጥናቱ ርዕስ “በመራቢያ፡ አካላቸዉ፡ ላይ፡ የፈንገስ፡ ስርጭትና፡ አባባሽ፡ መንገዶችን፡ በተመለከተ፡ በየካቲት ፲፪፡ ሆስፒታል፡ የነፍሰጡር፡ ምርመራ፡ ክሊኒክ፡ ነፍሰጡር፡ እናቶች፡ ለሚገለገሉ፡ ብቻ፤ አዲስ አበባ፤ ኢትዮጵያ” በሚል፡ ርዕስ፡ እያጠናሁ፡ እገኛለሁ፡፡ ይህ፡ ጥናትም፡ በተሳታፊ፡ ሙሉ፡ ፈቃደኝነት፡ ላይ፡ ተመስርቶ፡ ፈንገስ፡ በነፍሰጡር፡ እናቶች፡ መራቢያ፡ አካል፡ ላይ፡ ያላቸዉን፡ ስርጭት፡ እና፡ አባባሽ፡ መንገዶችን፡ ለመጠቀም፡ ያስችላል፡፡

ከጥናቱ፡ ተሳታፊ፡ የሚጠበቁ

በዚህ፡ ጥናት፡ ለመሳተፍ፡ የሚስማሙ፡ ከሆነ፡ ከብልትዎ፡ ፈሳሽ፡ ናሙና፡ እንዲወሰድ፡ እና፡ ለጥናቱ፡ እንዲወልድ፡ መስማማት፡ ይጠበቅቦታል፡፡ የጤና፡ ባለሙያ፡ ከእርሰዎ፡ ናሙናዉን፡ ይሰበስባል፡፡

ል፡፡ከተወሰደውም፡ናሙና፡ላይ፡የሚገኙ፡መረጃዎች፡ከዚህ፡ሆስፒታል፡ውጭ፡ለሚገኙ፡ለሥራው፡አግባብነት፡ላላቸው፡ሰዎች፡ቢነገር፡የማይቃወሙ፡መሆኑን፡መስማማት፡ይጠበቅቦታል፡፡ይሁን፡እንጂ፡ይህ፡ዓይነቱ፡መረጃ፡የእርሶን፡ማንነት፡የሚገልጹ፡ማስረጃዎን፡ማለትም፡ስም፡አድራሻናየመሳሰሉት፡መረጃዎች፡አይጨምርም፡፡ይልቁንም፡ለዚህ፡ጥናት፡አገልግሎት፡ብቻ፡የሚወልድ፡መለያ፡ቁጥር፡ጥቅም፡ላይ፡እንዲወልድ፡ይደረጋል፡፡ናሙና፡ሰጡ፡ማለት፡በሽታው፡ይገኙብዎታል፡ማለት፡አይደለም፡፡በእርሶዎ፡ናሙና፡ውስጥ፡የበሽታ፡አምጭ፡ተህዋስ፡ቢገኝ፡ከጤና፡ባለሙያው፡አስፈላጊውን፡ህክምና፡ያገኛለ፡፡

ተሳታፊው፡የሚያጠፋው፡ጊዜ

የተዘጋጀውን፡የስምምነት፡ቅጽ፡ለመፈረምና፡ናሙና፡ለመስጠት 10-15
ደቂቃ፡ያስፈልጋል፡፡

በጥናቱ፡በመሳተፍ፡የሚሰከትላቸው፡ችግሮች

ናሙና፡በሚሰበሰብበት፡ወቅት፡ምንም፡አይነት፡ችግር፡አያስከትልቦትም፡፡ሆኖም፡ናሙናው፡በሚወሰድበት፡ጊዜ፡ትንሽ፡የህመም፡ስሜት፡ሊኖር፡ይችላል፡፡የተለየ፡የሕመም፡ስሜት፡ከተሰማዎት፡አስፈላጊውን፡እርዳታ፡በነፃ፡እናደርጋለን፡፡

የመረጃው፡ሚስጥራዊነት

ማንኛውም፡የሰጡት፡መረጃ፡እና፡ከተወሰደው፡ናሙና፡ላይ፡የተገኘው፡የላቦራቶሪ፡ውጤት፡የሚወለደው፡ለጥናቱ፡አላማ፡ብቻ፡ነው፡፡ይህን፡ሚስጥር፡ሊያገኙ፡የሚችሉ፡የተወሰኑ፡የጥናቱ፡ተባባሪ፡ሠራተኞች፡ብቻ፡ናቸው፡፡ከዚህም፡በላይ፡ስለ፡እርስዎ፡ያለውን፡ማንኛውንም፡መረጃ፡የይለፍ-ቃልባለው፡የኮፒውተር፡የመረጃ፡ማህደር፡ውስጥ፡እንዲቀመጥ፡ይደረጋል፡፡

በጥናቱ፡በመሳተፍ፡የሚያስከትላቸው፡ጥቅሞች

ይህ፡ጥናት፡የማስተርስ፡ዲግሪ፡መመረቂያ፡እንደመሆኑ፡መጠን፡በመሳተፍዎ፡የሚያገኙት፡የገንዘብ፡ጥቅማጥቅም፡የለም፡፡ለወደፊት፡በተመሳሳይ፡ሁኔታ፡ውስጥ፡ላሉ፡በሽተኞች፡በመረጃ፡ላይ፡የተመረተ፡ህክምና፡ለመስጠት፡ያግዛል፡፡ከፈለጉ፡የላቦራቶሪ፡ውጤቶችን፡በነፃ፡ያገኛለ፡፡እንዲሁም፡ስለ፡አስፈላጊው፡ህክምና፡ከህኪምዎ፡ጋር፡ይነጋገራሉ፡፡

የጥናቱ፡ተሳታፊዎች፡መብት

ትብብርዎ፡ሙሉ፡በሙሉ፡በፍቃደኝነት፡ላይ፡የተመሠረተና፡ተሳትፎዎን፡መተውና፡በማንኛውም፡ሰዓት፡ጥናቱን፡ማቆም፡ይችላሉ፡፡በጥናቱ፡ውስጥ፡ያሎትን፡ተሳትፎ፡በማንኛውም፡ጊዜ፡የማቋረጥ፡ሙሉ፡መብትዎ፡የተጠበቀ፡ከመሆኑም፡በላይ፡ራሶን፡ከጥናቱ፡በማገለልዎ፡ምክንያት፡የሚቀርብዎት፡ምንም፡ዓይነት፡የሆስፒታል፡አገልግሎት፡አይኖርም፡፡ከዚህም፡በተጨማሪ፡ጥናቱን፡በተመለከተ፡ማንኛውንም፡ዓይነት፡ጥያቄ፡የመጠቅና፡ገለፃ፡የማግኘት፡መብት፡አለዎት፡፡የላቦራቶሪ፡ምርመራው፡ጤቱን፡ምበነፃ፡ማግኘት፡ይቻላል፡፡

ግንኙነት፡ናጥያቄ

ይህን፡ጥናት፡በተመለከተ፡ወይም፡ከዚህ፡ጋራ፡በተዛመደ፡መልክ፡ስለሚያጋጥሙ፡ድንገተኛ፡

ችግር፡ወይም፡ጥያቄ፡ካሎት፡በሚከተለው፡አድራሻ፡ይጠቀሙ፡፡

ተመራማሪ፡ቡሩታዊት፡አምደማርያም(ቢ.ኤስ.ሲ)

ሞባይል +251911720384

የሕክምና፡ላብራቶሪ፡ሳይንስ፡ትምህርት፡ክፍል፡የጤና፡ሳይንስ፡ኮሌጅ

አዲስአበባዩኒቨርሲቲ

ኢ-ሜይል፡ Brutatt@gmail.com

አማካሪ፡አዳነቢተዉ(ፒ.ኤች.ዲ)

ሞባይል +251911039162

የሕክምና፡ላብራቶሪሳይንስትምህርትክፍል! የጤናሳይንስኮሌጅ

አዲስአበባዩኒቨርሲቲ

ለተጨማሪመረጃአዲስአበባዩኒቨርሲቲ፡የሕክምና፡ላብራቶሪሳይንስትምህርትክፍልይጠይቁ፤

ስልክ-+251112755170

ከዚህበታችኛው፡ፊርማዎን፡ለእርስዎየተሰጠውን፡መረጃ፡ማንበብዎን፡መስማትዎን፡እና፡መገንዘብ

ብዎን፡የሚያሳይነው፡፡ከመፈረምዎበፊት፡እባክዎትን፡የጥናቱን፡ዓላማ፡የተሳትፎ፡ጉዳትና፡ጥቅሙ፡፡

የመተው፡የማቋረጥ፡መብትና፡ነፃነት፡እንዳለዎት፡ይረዱ፡፡ተስማምተዋል?

የጥናቱን፡መግለጫ፡አንብብያለሁ/

ሰምቻለሁ፡እናምተረድቻለሁ፡፡መመሪያውም፡እንደሆነና፡በእኔምንሊከሰት፡እንደሚችል፡ተረድ

ቻለሁ፡፡በጥናቱላይለመሳተፍ፡፡

- 1. እስማማለሁ -----
- 2. አልስማማም -----

IV: Amharic Versions of Consent form

የተሳታፊ ስምምነት ቅጽ

ይህገጽ“Prevalence of Vaginal candidiasis and associated factors among pregnant women at Yekatit 12 Hospital, Addis Ababa. ”

“በመራቢያ፣ አካላቸው፣ ላይ፣ የፈንገስ፣ ስርጭትና፣ አባባሽ፣ መንገዶችን፣ በተመለከተ፣ በየካቲት ፲፪፣ ሆስፒታል፣ የነፍሰጡር፣ ምርመራ፣ ክሊኒክ፣ ነፍሰጡር፣ እና ቶች፣ ለሚገለገሉ፣ ብቻ፣ አዲስ አበባ፣ ኢትዮጵያ” በሚል ርዕስ የተሳታፊ ስምምነት ቅጽ ነው። በመሆኑም እባክዎን በዚህ በታች የተዘረዘሩትን ጥያቄዎች ይረዱና፣ ለመሳተፍ ፈቃደኛ ሆነው ከተስማሙ መስማማት ያስገባሉ። ለማሳያ ደክመኛ ምን ላይ እንዲፈረሙ እጠይቃለሁ። 1. እኔ “በመራቢያ፣ አካላቸው፣ ላይ፣ የፈንገስ፣ ስርጭትና፣ አባባሽ፣ መንገዶችን፣ በተመለከተ፣ በየካቲት ፲፪፣ ሆስፒታል፣ የነፍሰጡር፣ ምርመራ፣ ክሊኒክ፣ ነፍሰጡር፣ እና ቶች፣ ለሚገለገሉ፣ ብቻ፣ አዲስ አበባ፣ ኢትዮጵያ”

የሚለው ጥናት አላማ በደንብ ተገንዝቤ አለሁ።።

2. ከእኔ የሚወሰደው ናሙና ለጥናቱ አላማ ብቻ እንደሚውል ተረድቻለሁ።።

3. ሁሉም መረጃዎች እና የናሙናው ጤንነት ለጥናቱ ብቻ የሚያገለግሉ ናቸው።።

4. በጥናቱ ላይ በመሳተፍ ምንም የገንዘብ ብክፍያ እንደማላገኝ ተረድቻለሁ።።

5. በጥናቱ ላይ ለመሳተፍ እንዲሁም በማንኛውም ጊዜ የማቃረን መብት እንዳለኝ አውቄአለሁ።።

6. ሁሉም መረጃዎች በአስተባባሪው/ዎች ተገልጾ ሊሰጡ ተረድቻለሁ።።

የተሳታፊ ፊርማ፡ -----

የተሳታፊ አድራሻ፡ -----

ቀን፡ -----

ይህን ጥናት በተመለከተ ጥያቄ ቢኖርዎት ወይም ከዚህ ጋር በተዛመደ መልኩ ስለሚያጋጥመዎት ድንገተኛ ግርበሚከተለው አድራሻ ይጠቀሙ።።

የሕክምና ላብራቶሪ ሳይንስ ትምህርት ክፍል፣ የጤና ሳይንስ ኮሌጅ፣ አዲስ አበባ ዩኒቨርሲቲ

ኢ-ሜይል፡ Brutatt@gmail.com

ለተጨማሪ መረጃ፡ አዲስ አበባ ዩኒቨርሲቲ፣ የሕክምና ላብራቶሪ ሳይንስ ትምህርት/ክፍል ይጠይቁ። ስልክ +251112755170

Annex V: Data Collection Form English version

For The Study “Prevalence of Vaginal candidiasis and associated factors among pregnant women at Yekatit 12 Hospital, Addis Ababa. ”

Interviewer language a,English b,Amahric c,Oromifa, d.Tigregna, e .Other _____

Respondent language a,English b.Amahric c.Oromifa,Tigregna, e Other _____

Study ID..... Study Serial Number..... Patient Code Number:

Data Collector’s initials: Date of data collection:.....

I. Participant Socio-demographic Data

1. Age: Years

2. Place of residence: A.Urban B. Rural

3. Highest level of Education

A. Informal B. Primary C. Secondary D. College

4. Marital Status

A. Married B. Single C. Divorced

5. Employment Status A. Employed B. Not Employed

II. Association of clinical profiles of respondents with vaginal infection.

1. History of abortion Yes No

2. Diabetes Mellitus Yes No

3. If yes Gestational age A. First trimester B. Second trimester C. Third trimester

4. Do you use Oral contraceptive? Yes No

5. Use of broad-spectrum antibiotics Yes No

6. Life time number of sexual partners’ Yes No

7. Do you have a child Yes No

8. Presence of lower abdominal pain Yes No

9. Vaginal discharge Yes No

10. Vaginal itching Yes No

11. Vaginal irritation Yes No

Annex VI: Amharic Versions translated questionnaires

በመራቢያ፣ አካላቸው፣ ላይ፣ የፈንገስ፣ ስርጭትና፣ አባባሽ፣ መንገዶችን፣ በተመለከተ፣ በየካቲት ፲፪፣ ሆስፒታል፣ የነፍሰጡር፣ ምርመራ፣ ክሊኒክ፣ ነፍሰጡር፣ እናቶች፣ ለሚገለገሉ፣ ብቻ፣ አዲስአበባ፣ ኢትዮጵያ” በሚል ርዕስ ለተሰጠው የተዘጋጀ ፡ መጠይቅ፡፡

የጥናቱ፡ መለያ ቁጥር _____

የመረጃ ሰብሳቢው ፊርማ _____

I. የተሳታፊዎች የአኗኗር ሁኔታ

1. እድሜሽ በአመት _____

2. የመኖርያ ሁኔታ ሀ. ከተማ □. ገጠር

3. የተማርሽው/ሩት ከፍተኛ ትምርት

ሀ. ትምህርት አልተከታተሉም ለ. የመጀመርያ ደረጃ ሐ. ሁለተኛ ደረጃ መ. ኮሌጅ ዩንቨርሲቲ

4. የጋብቻ ሁኔታሽ ሀ. ያገባ ለ. ያላገባ ሐ. አግብቶ የፈታ

5. የስራ ሁኔታ ሀ. ሥራ ያላት ለ. ሥራ የሌላት

II. የፈንገስ፣ ስርጭትና፣ አባባሽ፣ መንገዶችን፣ በተመለከተ

1. አስወርዶሽ ያውቃል? ሀ. አዎ ለ. የለም

2. የስኳር በሽታ አሞሽ ያውቃል ወይ ሀ. አዎ ለ. የለም

3. የአሁን አርግዝናሽ ስንት ወር ነው? ሀ. ሦስት ወር ለ. ሠድስት ወር ሐ. ከስድስት ወር በላይ

4. ከማርገዝሽ በፊት የእርግዝና መከላከያ ትጠቀሚ ነበር ወይ? ሀ. አዎ ለ. የለም

5. ፀረ ታህዋስያን መድሀኒቶች ትጠቀሚ ነበር ወይ? ሀ. አዎ ለ. የለም

6. በሕይወት ዘመንሽ/ዎት ከምን ያህል ሰው ጋር ግብረስጋ ግኑነት ፈፅመሻል/ ዋል?

ሀ. ከ አንድ ለ. ከሁለት ሐ. ከሦስት መ. አራት እና ከዚያ በላይ

7. ልጆች አሉሽ ወይ? ሀ. አዎ ለ. የለም

III. የ አሁን የሚሰማሽ በሽታ ምልክቶች በተመለከተ

8. ከ ማህፀን ወይም ከእምብርት በታች የህመም ስሜት አለ ወይ? ሀ. አዎ ለ. የለም

9. ከ ብልትዎ/ሽ የተለየ ፈሳሽ ታይቶሽ ያውቃል ወይ? ሀ. አዎ ለ. የለም

10. ብልትዎ/ሽን አሳክክዎት ያውቃል? ሀ. አዎ ለ. የለም

11. ብልትዎ/ሽን የማቃጠል ስሜት ነበርዎት ወይ? ሀ. አዎ ለ. የለም

Annex VII: Laboratory test Procedure for vaginal swab Specimen Collection and Processing

A. Sample collection: For diagnosis of fungal pathogen one vaginal swab will collect from the study subjects by experienced nurse

Sample collection procedure

1. The patient is position in the lithotomy position on the exam table
2. Use cotton or synthetic –tipped swab to obtain a sample of vaginal discharge
3. Process immediately after spacemen collection for Culture for fungus

B. Culture for yeasts

1. The vaginal swab will be inoculated onto Sabouroud Dextrose agar supplemented with antibacterial antibiotic.
2. All culture plates will be inoculated at 37°C for at least 48 hours.
3. Yeasts will be identified by employing conventional biochemical and assimilation test procedures.

C. Identification of yeast

Germ tube test Culture

Principle

- When incubated with serum at 37°C for 1 to 3 hours, *C.albicans* will form a germ tube.

Procedure

1. Suspend a small amount of yeast in 0.5 ml human serum
2. Incubate the test tube at 37°C for no longer than 3 hours
3. Place a yeast serum suspension on a slide, put a cover slip and look for germ tube
4. Germ tubes are formed within three hours by *C. albicans*

Interpretation

- A germ tube is approximately half as wide and three to four times as long as the yeast cells.
- No point of constriction should exist where the germ tube arises from the mother cell.

Annex VIII: Declaration

Title of project: “Prevalence of Vaginal candidiasis and associated factors among pregnant women at Yekatit 12 Hospital, Addis Ababa.”

I, the undersigned, declare that this MSc research project is my original work. It has not been presented for a degree in any other University. False statements could be cause for invalidating this research project and may lead to other administrative or legal action.

Principal investigator:

Name: BrutawitAmdemariam (BSc)

Address: Department of Medical Laboratory Sciences, AAU

Signature: _____ Date: _____

Advisor (s):

Name: AdaneBitew (MSc, PhD)

Address: Department of Medical Laboratory Sciences, AAU

Signature: _____ Date: _____

Addis Ababa University
School of Graduate Studies

As research advisor, I hereby certify that I have read and evaluated the thesis prepared by Brutawit Amdemariam under my guidance which is entitled: with “prevalence of vulvovaginal candidiasis and associated factors among pregnant women attending antenatal care unit at yekatit 12 hospital, Addis Ababa, Ethiopia”. I recommended that the work provided in this thesis is the researcher’s own research work. It has not been submitted elsewhere for any other degree or qualification in the study area. It has been conducted per the conditions of the technical and ethical requirements needed.

Advisor

Dr.Adane Bitew (BSc,MSc,PhD) Signature: _____ Date: _____

As members of the board of the MSc thesis open defense examination of Brutawit Amdemariam Mekria ,we certify that we have read ,evaluated the thesis and examined the candidate .We recommended that the thesis be accepted as it fulfills the requirements for the degree of Master of Science in Clinical Laboratory Sciences (Diagnostic and Public Health Microbiology Specialty) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Final approval and acceptance of the thesis is contingent up on the submission of the final copy to the council of graduate studies through the department graduate committee of medical laboratory science.

Signed by the Examining Committee:

External examiner _____ Signature: _____ Date: _____

Internal examiner: _____ Signature: _____ Date: _____