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VAGINAL CANDIDIASIS IN WOMEN OF CHILDBEARING AGE WITH THE RELATED CLINICAL VARIABLES AT MUTARE PROVINCIAL HOSPITAL, 2019

By

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160415

A RESEARCH PROPOSAL SUBMITTED IN PARTIAL FULLFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF MEDICAL LABORATORY SCIENCES IN THE COLLEGE OF HEALTH SCIENCES, AGRICULTURE AND NATURAL RESOURCES.

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The Researcher would like to acknowledge Africa University, the College of Health, Agriculture and Natural Sciences, department of Health sciences. A special acknowledgement goes to my supervisor for mentoring and giving me guidance.

DEDICATION

I dedicate this research proposal to my parents and family at large and to all those who have somehow contributed to this research project.

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ABSTRACT

BACKGROUNG: Vaginal candidiasis is a fungal infection which causes irritation, discharge and itchiness of the vagina. The infection is caused by Candida which is part of the normal microflora of the human body but its overgrowth can cause serious health problems. Overgrowth of Candida may result from factors that include: antibiotic use which causes an imbalance in the natural vaginal flora, pregnancy, uncontrolled Diabetes, an impaired immune system and the use of oral contraceptives (Mayo clinic, 2019).

OBJECTIVE: This study was conducted to establish the prevalence of vaginal candidiasis in women of childbearing age with clinical variables such as Diabetes, HIVAIDS, and pregnancy whose samples were tested at Mutare provincial hospital in 2019.

METHODOLOGY: The researcher used a cross sectional study design in analysing a total of 70 patient records with the aid of Microsoft excel as a data analysis tool.

RESULTS: The study findings showed that upon clinical examination the majority of study participants (61%) were suspected to have Candida infection, followed by Staphylococcus spp (25,70%), Streptococcus spp (5,70%), S.aureus (4,20%) and Enterobacteriaceae (2,80%) respectively. The study findings also indicated that Diabetes was the most common risk factor for vaginal candidiasis among study participants (28,5%), followed by pregnancy (17%), HIV/AIDS (14,2%) and contraception (2,8%) respectively.

CONCLUSION: Candida albicans colonization is still a big challenge in childbearing age women, especially in pregnancy. As a solution, there is a need to routinely do medical examinations, antenatal services and give appropriate treatment especially for pregnant women.

List of Acronyms

MPH	Mutare Provincial Hospital
OPD	Outpatient department
FCH	Family Child Health
VVC	Vulvovaginal candidiasis
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Syndrome
BSAT	Broad Spectrum Antibiotic Therapy
CNS	Coagulase Negative Staphylococcus
BSA	Broad Spectrum Antibiotics
BV	Bacterial Vaginosis

Definition of Abbreviations

Candidiasis- is a yeast fungi infection caused by overgrowth of candida species in moist areas of the body such as mouth, throat and skin. (CDC, 2007)

Vagina candidiasis- is the most uncontrolled growth or proliferation of candida species in the vagina that will then cause symptoms of vulvovaginal or vaginal candidiasis. (CDC, 2007)

Diabetes- a condition in which the human body cannot produce enough insulin or cannot use insulin as it should. Type 1 diabetes is when the body stops producing insulin and type 2 diabetes that is when the body cannot use the insulin produced by the pancreas. (CDC, 2019)

Atopy- a genetic tendency to develop allergic diseases such as allergic rhinitis, asthma and dermatitis or eczema.

Hyperglycaemia- refers to increased blood sugar. It occurs when the body does not produce enough insulin, a hormone produced by pancreas that absorbs glucose into the cells as a source of energy for the body. (Felman, A 2019).

CHAPTER 1 INTRODUCTION

In this chapter, the researcher introduces the area of study, through the use of available research on the subject in order to picture the magnitude of the problem. The researcher also points out the objectives of the study, limitations and delimitations.

1.1 Background Information

Candidiasis is an infection caused by a yeast fungus called candida that can normally be found as a commensal in the vagina without causing any symptoms. When the host microenvironment becomes imbalanced due to immunosuppression or any other causes, candida can proliferate causing symptomatic vaginal or vulvovaginal candidiasis, which is also known as a vaginal yeast infection. (CDC, 2017)

Vaginal candidiasis constitutes a burden among women of childbearing age worldwide and scientists estimate that 20% of women normally have candida which coexists in the vagina without causing any symptoms. (CDC, 2017)

Vaginal candidiasis affects approximately 75% of women of childbearing age. Factors that predispose women to vaginal candidiasis include hormonal fluctuations and immunosuppression related to pregnancy, use of contraceptive methods, diabetes, HIV/AIDS and broad spectrum antibiotic therapy (BSAT). It is estimated that about 5-10% of healthy women suffer from recurrent vaginal candidiasis without any predisposing factors. (Nelson et al, 2013).

Vaginal candidiasis is also considered the second most common vaginal infection among women of childbearing age, as a result of an opportunistic fungal infection that prevails when the body lacks protective immunity. VC poses a huge problem to clinicians and generates considerable direct and indirect economic costs associated with medication and healthcare

visits and scientific research also shows that VC is associated with pregnancy complications as well as susceptibility to HIV infection among those who are HIV negative (Zeng et al, 2018).

Diabetes has been related to resistant vaginal candidiasis, in relation to hyperglycaemia, atopy and allergy. A lifestyle characteristic of those with uncontrolled diabetes or persistently high blood sugar levels (such as drinking sweet drinks, eating sweet foods, occasionally or never performing physical training, sedentary lifestyle) have been associated with a predisposition to VC (Zeng et al, 2018).

Worldwide, recurrent vaginal candidiasis affects about 138 million women annually, with a global annual prevalence of 3871 per 100 000 women. Estimates also indicate that the 25-34 year age group has the highest prevalence (Denning et al, 2018). Women younger than 40 years old have also been shown to be at a higher risk of developing VC than the elder and generally women of reproductive age have a higher risk as compared to those that have reached menopause (Zeng et al, 2018).

Scientific research also shows that HIV positive women have a higher risk of developing vaginal candidiasis, as compared to those who are HIV negative, due to factors assumed to be related with immunosuppression (Apalata et al, 2014).

1.2 Problem Statement

Most women of childbearing age with vaginal candidiasis may not show early clinical symptoms until these become evident during pregnancy due to immunosuppression. Vaginal candidiasis has been associated with complications in pregnancy such as neonate systemic infection, congenital cutaneous candidiasis, premature membrane rupture, preterm delivery and low birth weight (Rasti et al, 2014).

Research has shown that if left untreated, vaginal candidiasis may lead to Pelvic inflammatory disease, a condition which can scar the fallopian tubes, causing infertility among women of childbearing age, thus the relevancy of studying the topic (Garcia et al, 2006).

Despite the efforts to reduce the incidence of HIV infections, the number of people infected, particularly women of childbearing age is significantly high and non communicable diseases such as diabetes are becoming of great concern.

Clinical symptoms alone such as vaginal discharge are not good markers of vaginal candidiasis, for patients with bacterial vaginosis may present with the same symptoms (Rathod et al, 2012).Laboratory confirmation of infection with candida is important, which is sometimes underestimated, the researcher studied the relationships between clinical symptoms of the patients in relation to laboratory findings.

Anecdotal evidence observed by the researcher indicated a high incidence and prevalence of vaginal candidiasis among women of childbearing age; the study established an appropriate scientific research.

The researcher also observed that no similar study had been previously done in Zimbabwe and conducted a research on the subject.

1.3 Research Questions

- What was the prevalence of vaginal candidiasis among Women of childbearing age (16-49 years) at Mutare Provincial Hospital?
- What was the prevalence of vaginal candidiasis in pregnant women?
- What was the prevalence of VC among women of childbearing age with HIV/AIDS or Diabetes?

- What were the Socio-Demographic characteristics of Women of childbearing age presenting with VC?

1.4 Purpose of the Study

The purpose of this research was to determine the prevalence of vaginal candidiasis among Diabetic and HIV positive women of childbearing age presenting at Mutare Provincial Hospital as well as their socio-demographic characteristics.

1.5 Objectives

The objectives of this study were:

- To determine the prevalence of vaginal candidiasis among diabetic and HIV positive Women of childbearing age (16-49) at Mutare Provincial Hospital
- To determine the prevalence of vaginal candidiasis in relation to clinical variables and describe the socio-Demographic characteristics of the study groups.

1.6 Justification of the Study

The study topic came as a result of the researcher's observations at the site where the research was conducted and the researcher intended to make a scientific study of the topic.

Vaginal candidiasis poses economic costs associated with medication, healthcare visits and expenditure on healthcare itself, besides complications that may arise during pregnancy as a result of the condition. Research also shows that it predisposes women to HIV infection, most probably as a result of lesions sustained in the genital area as the infection progresses.

Further complications may arise to those who are HIV positive and diabetic, who are naturally prone to other medical conditions; this research gave a picture of the magnitude of vaginal candidiasis among these different groups and help in local planning and policy making.

Due to its negative effects on fertility and the predisposition of women of childbearing age to vaginal candidiasis, a local research done on the topic helped on educating the target group on the risks and impact of the condition.

1.6 Hypothesis

- Vaginal candidiasis was more prevalent among younger women of childbearing age and pregnant women,
- HIV status and Diabetes was also found among those with vaginal candidiasis

1.7 Delimitations

The study was conducted at Mutare Provincial Hospital, which is located in Manicaland Province and provides referral services for the Province.

CHAPTER 2 LITERATURE REVIEW

This section covered the research topics related to the objectives of the study and to the problem that the researcher had found.

2.1 Vaginal Candidiasis: Definitions and Concepts

Candida species are part of the normal flora of the lower genital tract of healthy normal asymptomatic women, however, carrier rate is higher in women treated with broad spectrum antibiotics, pregnant women, diabetic women and women with HIV/AIDS (Zazove P et al. 2003). In recent years there has been a lot of discussion on the association of pregnancy, diabetes and HIV status with candida proliferation in the vagina, since normal persons are carrier of candida sp in the vagina without showing any symptoms or infection.

It is believed that higher oestrogen levels and higher glycogen content in vaginal secretions during pregnancy increase a woman's risk for developing vaginal candidiasis and it has been proven that episodes of vaginal candidiasis are more common in women of childbearing age (Monif et al, 2003)

Research indicates that vaginal candidiasis is the second most common vaginal infection in women of reproductive age, causing damage to the vagina. Estimates also indicate that approximately 70-75% of women of childbearing age will have at least one episode of vaginal candidiasis and about 40-50% will suffer from recurrence, with most cases being associated to candida albicans (Sobel, JD 1988).

2.2 Vaginal Candidiasis in Women under the Age of 49

Information from a study conducted in China on the risk factors of vulvovaginal candidiasis among women of reproductive age showed that patients under the age of 40 were at a higher risk of developing vulvovaginal candidiasis, and this falls under females of childbearing age.

The study also pointed out that a history of curettage increased possibility of candida infection; abortive women have a high proportion of infection than women without abortion, this emphasizes the relationship between vaginal candidiasis and pregnancy complications (Zeng et al, 2018).

Geiger et al, in a study done on the epidemiology of vulvovaginal candidiasis among University students has also indicated that the proportion of women diagnosed with vaginal candidiasis increases rapidly after the age of 17, with an estimated 54.7% of women diagnosed by age 25 (Geiger et al, 1995).

The previous study reinforces findings from other researchers that have found a relationship between pre-menopausal age or childbearing age, and higher prevalence of vaginal candidiasis.

2.3 Vaginal Candidiasis in Pregnant Women

Parveen N et al indicates that the incidence of vaginal candidiasis is doubled in pregnant women; particularly the third trimester of pregnancy compared to non pregnant women, due to increased sugar content in vaginal secretions as a result of increased oestrogen levels and altered vaginal pH.

A study done in Libya on the prevalence of vaginal candidiasis among pregnant women analysed samples from both pregnant and non pregnant women, coming to the conclusion that vaginal candidiasis was more prevalent among women aged between 16-25 years old (46.7%), followed by those aged between 26-35 years old (40.7%) and the lowest percentage (36.1%) were isolated from women aged between 16-25 years (Altayyar et al, 2016).

Nnaemeka J et al, in a study done in Nigeria, on the prevalence of vaginal candidiasis among pregnant women indicates however that pregnant women aged between 26 to 30 years have

the highest prevalence, but relatively low between the ages 36 to 45 years. The total prevalence of vaginal candidiasis among pregnant women was 30%. (Nnaemeka J. et al 2010).

2.4 Vaginal Candidiasis in relation to HIV/AIDS Women

A research done in Tanzania on the prevalence of vaginal candidiasis and associations indicated that nearly half (45.7%) of the women seeking primary care for genital infections had vaginal candidiasis, which was only second most prevalent condition after bacterial vaginosis. The researchers also indicated that over one fifth of the patients were HIV seropositive, which compares well with other studies. The study also highlights that most patients were young (20-29 years old), which falls within childbearing age and also confirms what other studies have discussed (Namkinga et al, 2005).

Spinillo et al, in a study on vulvovaginal candidiasis and HIV infection, indicates that HIV seropositive women were at a higher risk for candida albicans vaginal infection and had shorter recurrence time periods, which means that recurrence is more likely to happen in HIV infected women (Spinillo et al, 1994).

2.5 Vaginal Candidiasis in Relation to Diabetes Mellitus

A study done in Iran on vaginal candidiasis and its related factors in diabetic women concluded that 71% the diabetic women analysed had clinical vaginitis, and 12.5% had candida vaginitis (Malazy OT et al. 2007).

The previous study agrees with similar studies that have indicated a relationship between vaginal candidiasis and diabetes as a result of hyperglycaemia, allergy and atopy.

Malazy et al, in a study done in Iran on vulvovaginal candidiasis and its related factors, indicates that there is no significant relationship between positive vaginal candida culture and

diabetic status. This disagrees with most studies that have indicated that vaginal candidiasis is more common in women with diabetes mellitus. The researchers also indicate that the true challenge in diabetic women is intensity of infection and slow response to therapy, with complications and recurrence more common in diabetic patients (Malazy et al, 2007).

2.6 Risk Factors Associated with Vaginal Candidiasis

Sobel J indicates that candida colonisation occurs in 10-20% of HIV negative non pregnant females. He also highlights that frequency increases to 15-20% in pregnant women and declines significantly in post menopausal women (Sobel J, 2002).

Schuman P, et al., Ezeigbo et al, all indicate that vaginal candidiasis is significantly increased in HIV positive women, as well as pregnancy, diabetes and history of previous symptomatic candida vaginitis. These findings agree with previous researchers that have outlined the same relationship.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the researcher describes the method used to carry out the study. Topics such as the research design used; data collection procedure and data analysis were discussed.

3.2 Research Design

The researcher used a retrospective cross sectional study design. A cross sectional study is a subset of quantitative methods of research, relating to descriptive designs.

A cross sectional design examines the relationship between the disease and other related factors and other variables that might interest the researcher in a specific population at a particular point in time. (Last, 2001)

3.3 Study Setting

The study participants were recruited from Mutare Provincial Hospital Laboratory. The researcher selected this hospital laboratory because many patients from districts and some private hospitals are referred to MPH.

3.4 Study Population

The researcher used records from HIV positive, contraceptive users, broad spectrum antibiotic therapy users and diabetic women of childbearing age that had been attended to at MPH during the year of 2019, as well as pregnant patients documented with episodes of VC.

3.5 Data Collection Procedure

The Researcher used laboratory records from female patients who were HIV positive, pregnant and/or diabetic with documented vaginal candidiasis. The researcher analysed records from 103 women who had been attended to at Mutare Provincial Hospital during the year of 2019.

3.6 Sample Size

The researcher used a total sample size of 144 laboratory records with documented VC symptoms and known HIV/AIDS and diabetic status.

To come up with the sample size, the researcher used a formula a sample size calculation formula in cross sectional medical studies by Pourhoseingholi M, et al 2015.

$$N = \frac{Z^2 P\,(1-p)}{D^2}$$

Where:

- N is the sample size
- Z is the statistic corresponding to 95% confidence interval, that is 0.95
- P is the expected prevalence which is 20% (CDC, 2017), which is 0.20
- D is the absolute precision 0.05

Therefore:

$$N = \frac{(0.95^2)\,(0.20)(1-0.20)}{0.05^2}$$

N= 144.4

N= 144

3.7 Data Analysis

The researcher used statistical methods of data summarising such as the mean, median and standard deviation of the mean and data presentation techniques such as tables, pie charts and histograms to present and analyse data. Packages such as Microsoft Excel were also used in data analysis. Childbearing age (16-49) was the dependent variable, while characteristics that

caused or determined the risk of vaginal candidiasis infection such as pregnancy, HIV/AIDS and diabetes mellitus, were the independent variables.

3.7.2 Exclusion Criteria

The study excluded women below and above the age of 16-49 respectively and with missing data.

3.8 Instruments

The extraction tool used to collect data and information from Mutare Provincial Hospital was developed by the researcher which included the date which the samples were collected, age of the participant, suspected and diagnosed organism/s and the clinical variables.

3.9 Pretesting of Instruments

A pretesting process is where survey questions and questionnaires are tested before applying them to the target study population to evaluate and check whether they are reliable and valid. In this research study the researcher used tables with the target subtopics for the pretesting.

3.10 Ethical Considerations

The researcher started data collection after approval from the Africa University Research Ethics Committee (AUREC) and after getting permission to collect data from Mutare Provincial Hospital and the College of Health, Agriculture and Natural Sciences. The Researcher also ensured that patient records were kept confidential and secure. No consent forms were used prior to data collection, due to the nature of the study.

CHAPTER 4 RESULTS

4.1 Vaginal candidiasis in diabetic, pregnancy, contraceptive use, BSAT and HIV positive women of childbearing age

A total of 70 patient records were collected and analysed using Microsoft excel as a data analysis tool. Patients were selected according to sex, age group and colonisation with Candida as well as other associations of concern to the study.

The study participants were females aged between 16 and 49 years old with observed vaginal colonisation with Candida albicans as well as HIV infection, Diabetes, BSAT, contraception use and pregnancy.

The average age was 30 years and minimum and maximum ages were 16 and 48 years respectively.

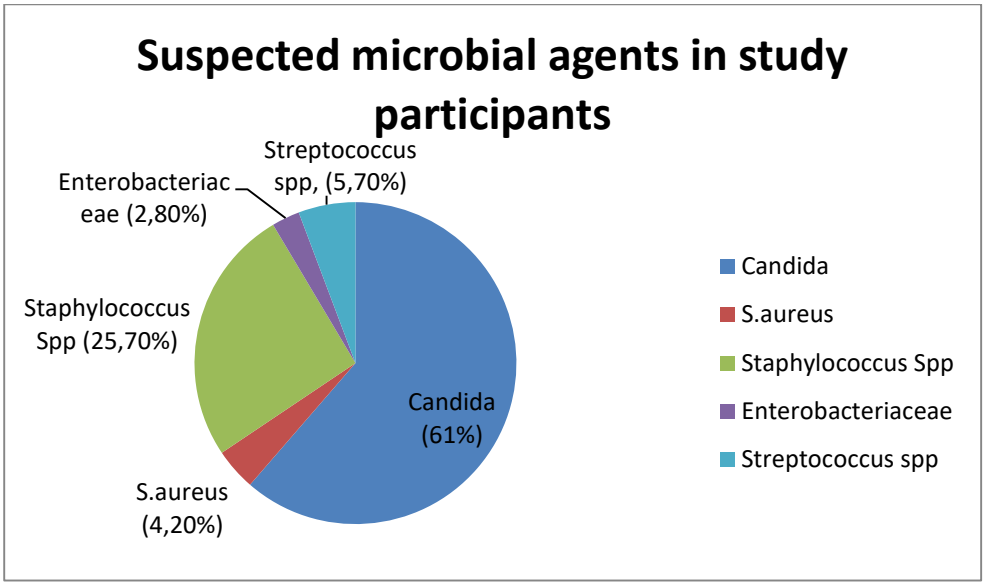
The prevalence of vaginal candidiasis among diabetics, BSAT, contraceptive use, HIV/AIDS positive patients and pregnant women was calculated using the following formula:

$$\text{Prevalence}_{(VC)} = \frac{Total\ Number\ of\ patients\ with\ VC\ and\ Diabetis,HIV\ or\ pregnancy}{Total\ Number\ of\ Patients\ with\ Candida\ albicans} \text{ x } 100$$

4.2 Vaginal Candidiasis in Study Participants and associations

Figure 1: Suspected Microbial Agents in study participants

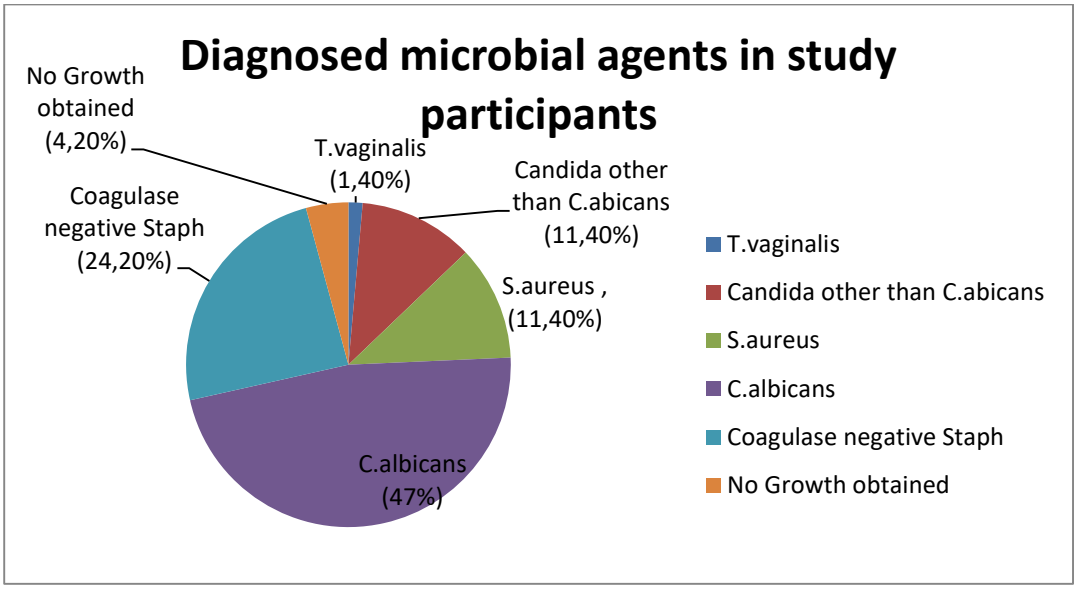
Figure 1



The pie chart above shows the different microbial agents suspected in study participants upon clinical examination. The majority of participants (61%) were suspected to have Candida infection, followed by Staphylococcus spp (25,70%), Streptococcus spp (5,70%), S.aureus (4,20%) and Enterobacteriaceae (2,80%) respectively.

Figure 2: Diagnosed microbial agents in study participants

Figure 2



The pie chart above shows diagnosed microbial agents in study participants upon laboratory testing. The majority of study participants were diagnosed with C.albicans (47%) followed by Coagulase negative Staph (24, 20%), Candida other than C.albicans (11, 40%), S. aureus (11, 40%), and T. vaginalis (1, 40%) respectively.

Table 1: Age variation in study participants with C. albicans

Table 1

Variable	**Outcome**	
Age (Years)	**Candida N (n%)**	**No Candida N(n%)**
16-26	14 (20)	17 (24,2)
27-38	10 (14,2)	11 (15,7)
39-48	11 (15,7)	8 (11,4)

The table above shows the age variation in study participants with C.albicans related to vaginal candidiasis and participants without C.albicans. In study participants with C.albicans the majority (20%) were aged between 16-26 years, followed by those aged between 27-38 years (14,2%) and 39-48 years (15,7%) respectively.

4.3 Prevalence of VC in relation to Clinical Variables

Table 2: Prevalence of VC

Table 2

	Candidiasis	
Clinical variable	**No (%)**	**Yes**
Diabetes	19 (27)	20 (28,5)
HIV	8 (11,4)	10 (14,2)
Pregnancy	8 (11,4)	12 (17)
Contraception	5 (7,14)	2 (2,8)
BSA	7 (10)	9 (12,8)

The table above shows the prevalence of each clinical variable of interest to the study in relation to Candidiasis. The majority of participants without Candida infection had Diabetes (27%), followed HIV/AIDS (11,4%).Pregnancy (11,4%), BSA (10%) and Contraception (7,14%), respectively. In patients with Candidiasis the majority of study participants had Diabetes (28,5%), followed by pregnancy (17%), HIV/AIDS (14,2%), BSA (12,8%) and contraception (2,8%) respectively.

Table 3: Suspected organisms versus diagnosis in study participants

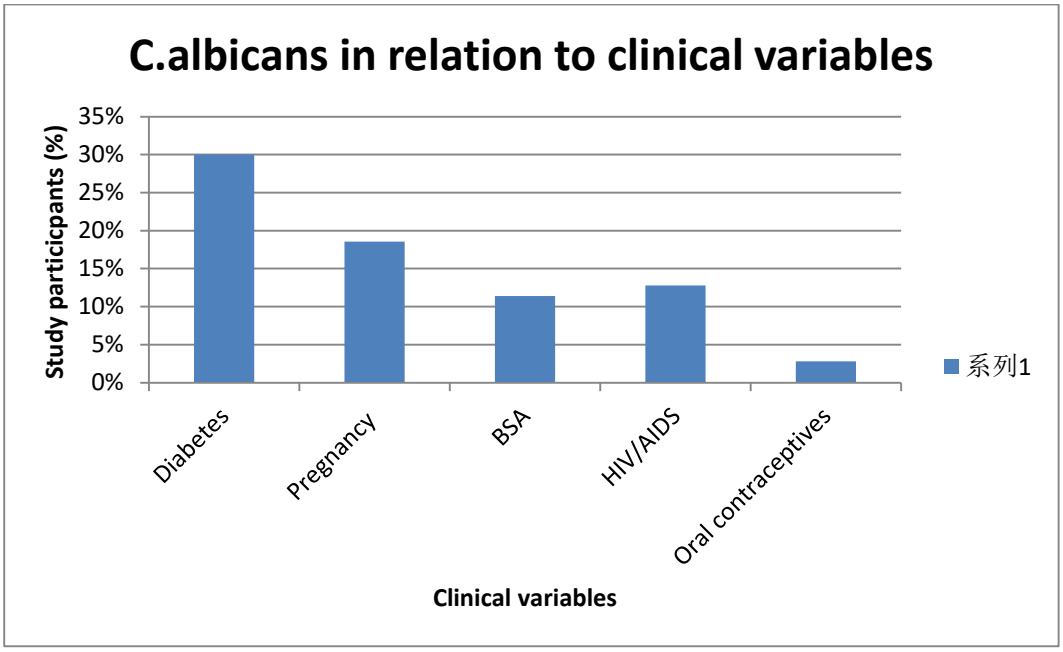
Table 3

Suspected Organism	Diagnosed	Study participants N(n%)
Candida albicans	Candida albicans	19 (27)
Candida spp	Candida other than C.albicans	8 (11,4)
S.aureus	S.aureus	1 (1,4)
CNS	CNS	10 (14,2)
Streptococcus spp	S.pyogenes	3 (4,2)
Enterobacteriaceae	Klebsiella spp	2 (2,8)
Candida albicans	S.pyogenes	3 (4,2)
Candida albicans	T. vaginalis	1 (1,4)

The table above shows suspected organisms in relation to the established diagnosis in study participants. The majority of study participants (27%) were suspected to have C.albicans and confirmed diagnosis indicated C.albicans, followed by Coagulase negative Staph(CNS) with a confirmed diagnosis of CNS (14,2%), Candida spp with a confirmed diagnosis of Candida other than C.albicans (11,4%), Streptococcus spp with a confirmed diagnosis of S.pyogenes (4,2%0, C.albicans with a confirmed diagnosis of S. pyogenes (4,2%), Enterobacteriaceae with a confirmed diagnosis of Klebsiella spp (2,8%) and S.aureus with a confirmed diagnosis of S.aureus (1,4%) respectively.

Figure 3: C.albicans and related clinical variables

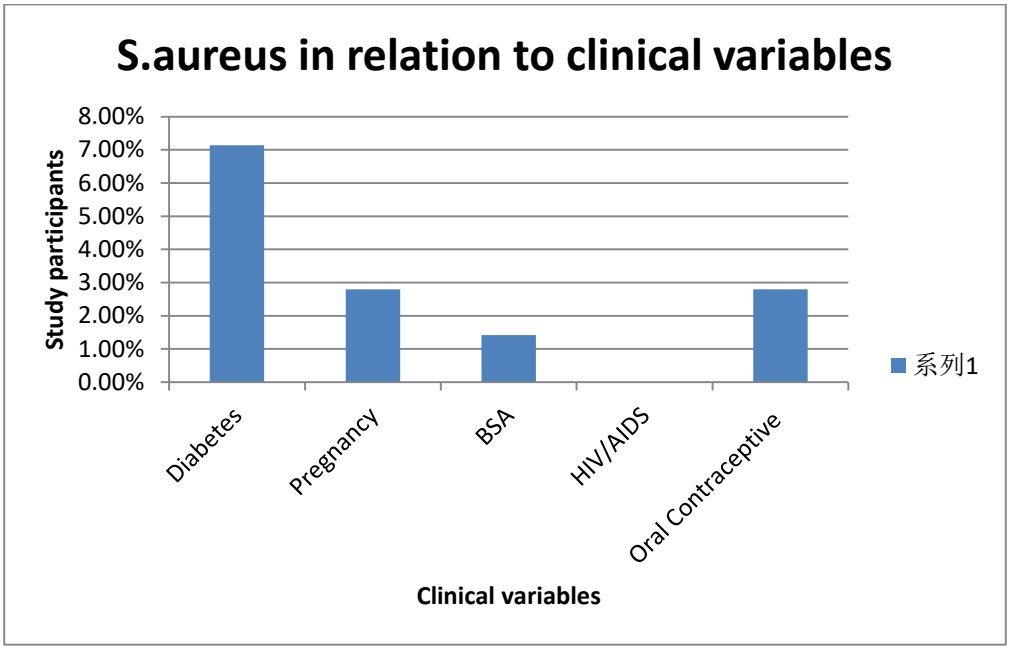
Figure 3



The bar graph above shows the Study participants with C.albicans infection in relation to each individual clinical variable of interest to the study. The majority of study participants with VC had Diabetes (30%) , followed by HIV/AIDS (12%), pregnancy (18%), BSA (11%) and oral contraception (2%).

Figure 4: S. aureus and related clinical variables

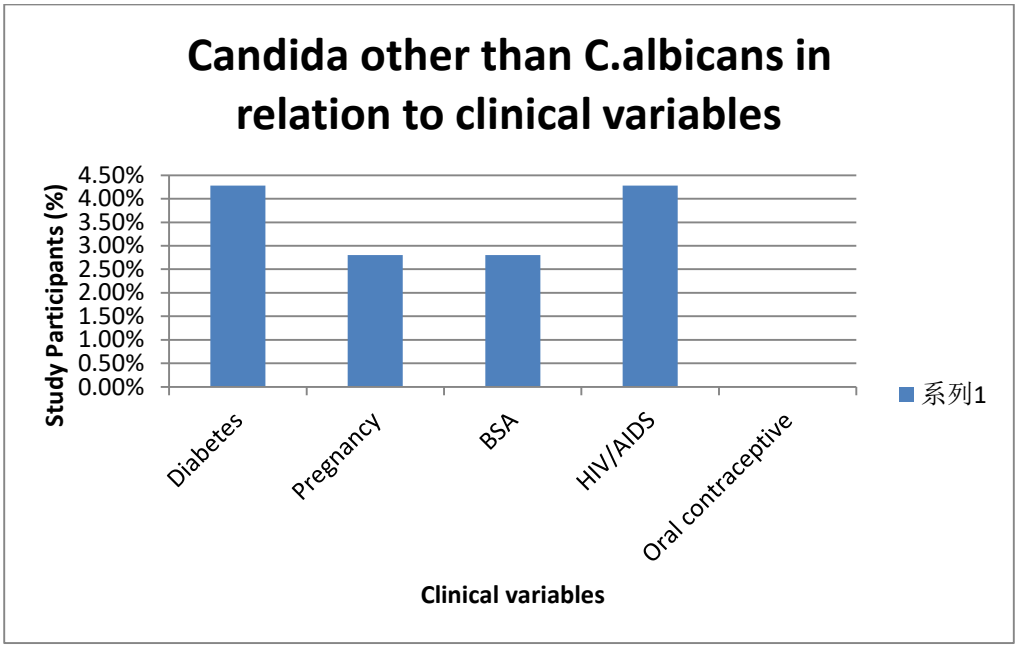
Figure 4



The bar graph above is a representation of Study participants with S.aureus infection in relation to clinical variables of interest to the study. The majority of participants with a diagnosis of S.aureus had Diabetes (7,2%), followed by pregnancy (2,82%) , oral contraception (2,82) and BSA (1,30%) respectively.

Figure 5: Candida other than C.albicans and related clinical variables

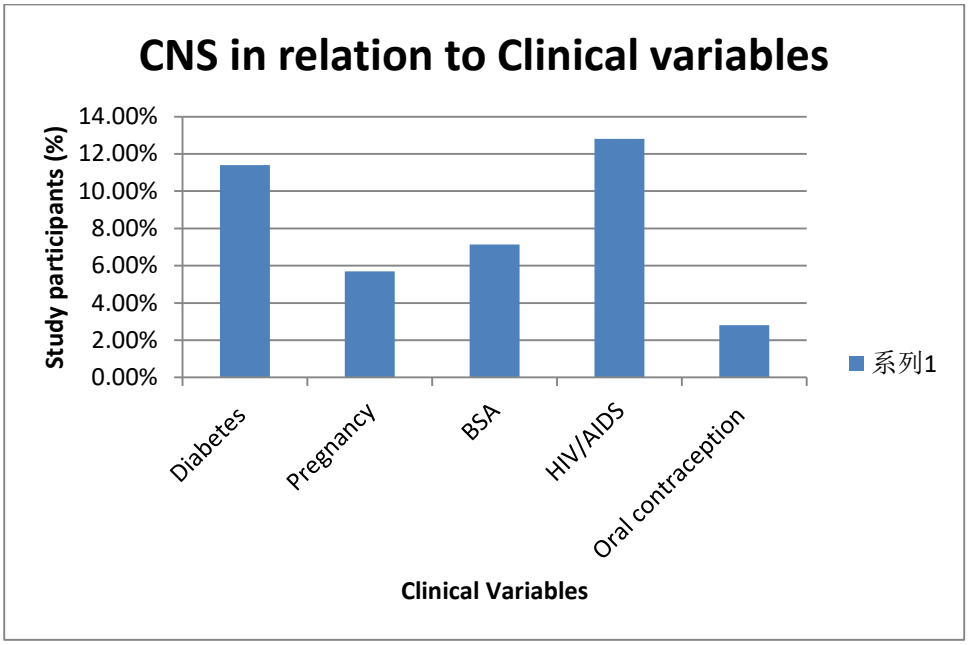
Figure 5



The bar graph shows a representation of study participants with Candida other than C.albicans in relation to clinical variables. The majority of participants had HIV/AIDS (4,6%), followed by Diabetes (4,3%), BSA (2,6%), and pregnancy (2,6%) respectively.

Figure 6: CNS and related clinical variables

Figure 6



The bar graph shows a representation of Coagulase Negative Staph in relation to clinical variables of interest to the study. The majority of participants had HIV/AIDS (12, 2%), followed by Diabetes (10.8%), BSA (6,3%), Pregnancy (4,9%) and Oral contraception use (2.2%).

CHAPTER 5 DISCUSSION

In this chapter, the researcher discussed the results, implications of the findings and the recommendations suitable to the study findings.

5.1 Introduction

Vaginal candidiasis is an infection caused by Candida, a fungus that is found as a commensal in the mouth, throat, skin and vagina without causing any problem in a healthy individual. Factors that are often associated with predisposition to vaginal candidiasis include pregnancy, use of oral contraceptives, Diabetes and immunosuppression such as in HIV infection and administration of immunosuppressive therapy. (CDC,2019).

The present retrospective study, included a total of 70 women aged between 16 and 49 years old presenting at Mutare Provincial Hospital with symptoms of vaginal candidiasis, showed that out of a range of suspected microbial agents 61% of the participants were suspected to be infected with candida and a total of approximately 40% were suspected to be infected with a bacterial agent.

It is often difficult to tell upon suspicion if the patient presenting with symptoms of VC has bacterial vaginosis or an actual vaginal yeast infection because the two often have similar symptoms but different causes and treatments. Clinically established information points out that about 40-50% of cases that present with such symptoms often have bacterial vaginosis and only about 20-25% will have a yeast infection. Information from the present study does however show that upon clinical examination the majority of study participants (61%) were suspected to have a yeast infection in contrast to only a total of 40% having a bacterial agent as the suspected causative agent. (Nichols, H. 2020). Ofori A. et al in a similar manner also indicates that bacterial vaginosis is the most common cause of abnormal vaginal discharge in women of child bearing age.

The researcher of the present study also found out that upon submission of vaginal swabs for laboratory testing of samples the majority of study participants were found to be infected with C. albicans (47%) and Candida other than C. albicans was present in only 11,40% of the study participants. The remaining 35,6% and 1,4% of the study participants were diagnosed with bacterial infection and T. vaginalis respectively. In a similar study carried out in Ghana, the researchers established that the majority of study participants with symptoms of vaginal infection had infection with candida (36,5%), followed by 30,9% participants that had bacterial vaginosis and 1,4% of the study participants were found to be infected with T. vaginalis (Ofori A, et al 2019).

In another study on the prevalence of vaginal candidiasis in females of reproductive age conducted in Dubai the researcher established that C.albicans was found in 76,05% of the study participants and only 23,94% of the participants were found to have candida other than C.albicans (Salvi M, 2019). These findings agree with the results of the present study which also concluded that C.albicans was more common in study participants as compared to candida other than C.albicans.

The researcher of the present study also found out that the majority of participants diagnosed with candida were aged between 16-26 years, followed by those aged between 27-38 years and 39-48 years respectively. In a similar study conducted in Libya Altayyar et al indicates that VC was more prevalent in women aged between 16-25 years old (46,7%), followed by those aged between 26-35 years old (40,7%) and lowest percentage (36,1%) were isolated from women aged between 36-45 years (Altayyar et al, 2016). Zhang et al in a study on VC among women of reproductive age conducted in China also seems to agree by indicating that the researchers observed that age under 40 years was a significant risk factor for VC.

Salvi M in another study also indicates that the highest number of positive cases for C.albicans in VC were aged between 26-30 years (39%), followed by the 31-35 years age group (30%) and 36-40 years (29%). The study also indicates that after 30 years, age wise prevalence was declining which agrees with the previous researchers and the findings of the present study. These findings could be attributed to a higher sexual activity in those aged below 40 years and also use of contraceptives in those below 40 years (Salvi M, 2019).

This study also established that in relation to its clinical variables, VC was more common in Diabetic women (28,5%) when compared to other clinical variables including : Pregnancy (17%) HIV (14,2%), BSA (12,8%) and Contraception (2,8%). Zhang et al indicates that although their study could not elute the relation between VVC and Diabetes mellitus, the study established that frequently drinking sweet drinks and frequently eating sweet foods could increase the susceptibility to VVC and that increased glucose in vaginal secretions may promote the adherence of Candida albicans to epithelial cells, (Zhang T, et al. 2018).

Salvi M in a study cited previously also indicates that Diabetes was the second most common risk factor found in 56% of the study participants. Oral contraceptive use and pregnancy were found in 28% and 26% of study participants respectively (Salvi M, 2019).

This study also showed that the prevalence of vaginal candidiasis in pregnant women was 17%, the second highest prevalence in this study, after the prevalence in diabetic women (28,5%). Konadu D et al, in a study conducted in Ghana similarly indicated that there was a high prevalence of VVC in pregnant women (36.5%). The study attributes such a high prevalence to the lack of proper sanitary conditions in most rural communities in Ghana. (Konadu D, et al. 2019).

Susceptibility to VC in pregnancy can also be attributable to a high concentration of oestrogen in pregnancy which provides a favourable environment for the growth of Candida

spp. VC in pregnancy may be a risk factor for abortion, preterm and low birth weight (Kiss H, et al. 2004).

This study also showed that the prevalence of vaginal candidiasis in HIV positive pregnant women and diabetic and pregnant women was 1.9% and 0.9% respectively. Sobel J, 2002, indicated that candida colonisation occurs in 10-20% of HIV negative non pregnant women and that the frequency increased in to 15-20% of HIV positive pregnant women and that it declined significally in postmenopausal women.

Zheng, N et al, 2013, states that poor glycaemic control especially when there is glycosuria and increased plasma HBA1c concentrations in diabetic pregnant women might be associated with disturbances in the vaginal fungal flora.

This study also showed that contraceptive methods (2,8%) contributed to the growth and colonisation by C. albicans. Gugnani et al,2001, in a study conducted in Nigeria on the effects of contraceptive use and colonisation with Candida species indicated that contraceptive users had a vaginal candidiasis prevalence of 51,5% and non-contraceptive users had a prevalence of 40,6%.

5.2 Implications of Findings to Public Health

The findings of this study indicated a high prevalence of vaginal candidiasis among women of childbearing age with Diabetes, Pregnancy and HIV/AIDS. Based on these findings it is important to emphasize the need for education of women of childbearing age on the risks associated with vaginal candidiasis such as preterm delivery and other pregnancy complications. More effort also needs to be put on the prevention, early diagnosis and proper management of Diabetes mellitus particularly in women of childbearing age. The need for the prevention and appropriate management of HIV/AIDS in women of childbearing age should also be taken into consideration.

The clinical variables associated with predisposition to vaginal Candidiasis in women of childbearing age as emphasized in this study must influence more effectively health policies directed at preventing vaginal candidiasis and its complications, especially in pregnancy.

5.3 Limitations to the study

The researcher conducted a retrospective study and as a result, not all necessary information for this study was immediately available and not all confounders could be traced by the researcher due to the nature of the research.

5.4 Study Conclusion

The researcher concluded that there is a high prevalence of vaginal candidiasis among women of childbearing age with Diabetes, HIV/AIDS and Pregnancy. Women with Diabetes had the highest prevalence compared to pregnant women and those with HIV/AIDS.

5.5 Recommendations

The researcher recommends that a prospective study be conducted on the incidence and associations of vaginal candidiasis among women of childbearing age in Manicaland.

The researcher also recommends that routine medical examination, adequate antenatal services and appropriate treatment especially for pregnant women which can prevent complications associated with VVC like preterm infants and abortions.

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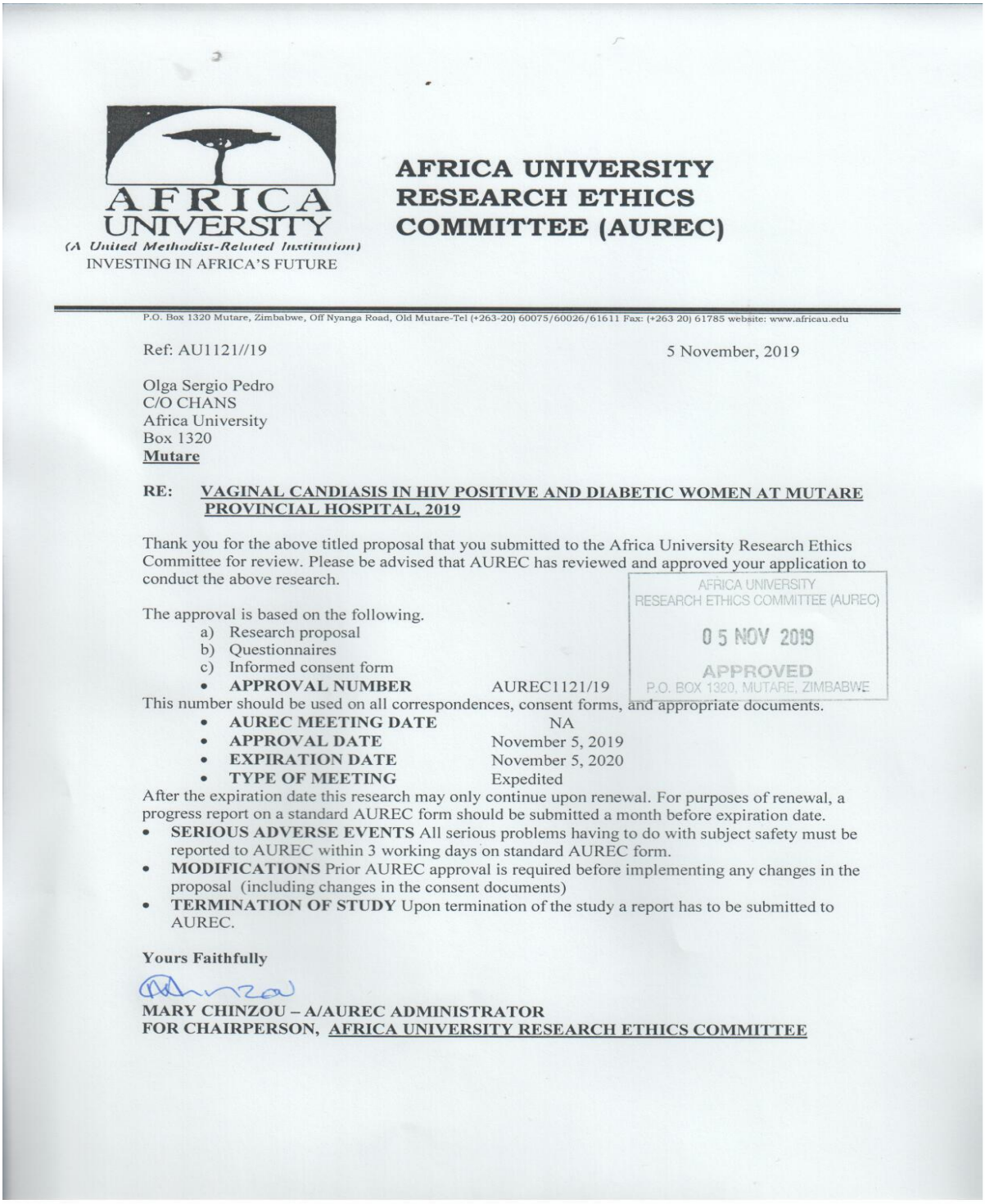
Appendix 1 AUREC Approval letter



AFRICA UNIVERSITY
(A United Methodist-Related Institution)
INVESTING IN AFRICA'S FUTURE

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

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Ref: AU1121//19

5 November, 2019

Olga Sergio Pedro
C/O CHANS
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Mutare

RE: VAGINAL CANDIASIS IN HIV POSITIVE AND DIABETIC WOMEN AT MUTARE PROVINCIAL HOSPITAL, 2019

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
05 NOV 2019
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

The approval is based on the following.

a) Research proposal
b) Questionnaires
c) Informed consent form

- **APPROVAL NUMBER** AUREC1121/19

This number should be used on all correspondences, consent forms, and appropriate documents.

- **AUREC MEETING DATE** NA
- **APPROVAL DATE** November 5, 2019
- **EXPIRATION DATE** November 5, 2020
- **TYPE OF MEETING** Expedited

After the expiration date this research may only continue upon renewal. For purposes of renewal, a progress report on a standard AUREC form should be submitted a month before expiration date.

- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

Yours Faithfully

MARY CHINZOU – A/AUREC ADMINISTRATOR
FOR CHAIRPERSON, AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

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