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RESEARCH ARTICLE

The Role of Health Outcomes On *C, Albicans*, and *T, Vaginalis* Prevalence Among Pregnant Women in South-East Nigeria

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Abstract

The purpose of the current study was to investigate the role of diabetes, hypertension, prolonged use of antibiotics and use of contraceptives on pregnant women with *C. albicans* and *T. vaginalis* infections. Three hundred and thirty-six vaginal specimens were collected from pregnant women through their consulting physicians in the selected health institutions within the study parameter. The test result revealed that only one hundred and thirteen of the total vaginal specimens tested positive for C. albicans, while seventeen tested positives for T. vaginalis. However, data from the questionnaire relating to health outcomes revealed that mostly the reported health positions were from the participants diagnosed with *candidiasis*. Only a few with *trichomoniasis* reported any of the health outcomes. The study concluded that the health conditions studied were correlated with the prevalence of infections among pregnant women in Nigeria's South-East.

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Introduction: -

Over the years, human health has been challenged due to the increasing impact of fungal activities on the human body. There is a growing concern about the widespread of fungal diseases among humans, mainly caused by immune-compromised situations and caused by several health conditions and the use of an antibiotic that impacts the human microbiome (Sellam & Whiteway, 2016). The incidence of Candida-caused infections has increased worldwide, with mortality rates exceeding 70% in certain patient populations (Kumar, Renáta, & Attila, 2020). *C. albicans* is the primary cause of Candida infections in most countries.

Candida albicans are regular microbiota members within the gastrointestinal tract, respiratory tract, vaginal areas, and mouth (Stringer, 2006). Candida albicans are part of our natural microflora or the microorganisms that commonly live in or on our bodies (Sethi, 2019). These microorganisms typically reside in various parts of the human body, such as the mouth and vagina. Candida albicans are among the most prevalent fungal species of the human microbiota (Nobile & Johnson, 2015). *T. vaginalis* is among the primary cause of Candida infections in most countries (Jang, Lee, Kwon, You, & Ko, 2019).Previous research (e.g., Kabir, Hussain, & Ahmad, 2012; Ruhnke & Maschmeyer, 2002) referred to Candida albicans as harmless and opportunistic fungal pathogens that occupy the gastrointestinal and urinary tracts of immune-compromised patients, including some healthy individuals. However, in healthy individuals, Candida albicans do not produce disease, as another microbiota suppresses its growth. However, it can cause life-threatening infections in immunosuppressed patients (Sellam & Whiteway, 2016).The

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vast majority of Candida infections are mucosal, manifesting as vaginal or oral candidiasis (Naglik, Richardson, & Moyes, 2014).

Recently candida species have become crucial nosocomial bloodstream infection and the causative agents of superficial and invasive candidiasis (Naglik et al., 2014). The increasing incidence and prevalence of the candida species, including its role in health mortalities, research has focused on understanding the basics of their pathobiology, virulence factors, predisposing conditions, along with the immune responses of both healthy and immune-compromised individuals (Kumar, Renáta, & Attila, 2020).

Similarly, Trichomonas vaginalis is among the non-viral sexually transmitted diseases. Trichomonas vaginalis is found only in the lower genitourinary tract. It is a single, spherical, motile, flagellated parasite with a barbed tail (called an axostyle) that resides in the urogenital tract of humans(Coleman, Gaydos, & Witter, 2013). The organism adheres to and overwhelms vaginal epithelial cells through phagocytosis(Lazenby, Soper, & Nolte, 2013). The organism is estimated to be affecting more than 270 million people worldwide(Ton Nu, et al., 2015). It is estimated that the annual prevalence of Trichomonas vaginalis worldwide exceeds that of chlamydia and gonorrhea combined(Bouchemal, Bories, & Loiseau, 2017). Therefore, it is a significant public health problem(Kissinger, 2015). Research (e.g., Coleman et al., 2013) has linked Trichomonas vaginalis to certain adverse reproductive health outcomes such as pregnancy complications, pelvic inflammatory disease, and an increased risk of HIV transmission. Consequently, it is now considered a critical dependent pathogen (Mahmoud, et al., 2015). Even though the organism survives for several hours in urine and semen specimens and on towels and clothing, non-sexual transmission is believed to be rare (Echenbach, 2009).

Although Trichomonas vaginalis is prevalent in women due to their higher occurrence of symptoms, the organism also infects men (Lin, et al., 2019). The majority of infected individuals are asymptomatic or have non-specific symptoms, making diagnosis difficult (Sherrard, 2017). The organism typically triggers an aggressive local cellular immune response with inflammation of the vaginal epithelium and exocervix in women, including the urethra of men(Sorvillo, Smith, Kerndt, & Ash, 2001). In women, about 50% of the cases experience symptoms ranging from severe vaginal inflammation accompanied by a frothy malodorous discharge and dyspareunia to an asymptomatic carrier state(Ton Nu, et al., 2015).

Prevalence in Southeast Nigeria

Asemota (2018) studied the infection distribution in Nigeria's six geopolitical zones and the prevalence over the years. The report revealed that of the 36 states in the country, only 26 states, including the Federal Capital Territory (FCT), Abuja, have partly evaluated the disease's prevalence. Research (e.g., Amadi & Nwangbo, 2013; Uneke, Ugwuoru, Ali, & Ali, 2006) has implicated certain variables such as poverty, inadequate personal hygiene, etc., illiteracy as the common risk factors for the transmission of *T. vaginalis*.

An exhaustive study has been conducted within the southeast region to assess the prevalence of C. albicans and T. vaginalis (e.g., Sunday-Adeoye, Adeoye, Umeora, & Okonta, 2010; Ulogu, Obiajuru, & Ekejindu, 2007; Onyido et al., 2014; Ogomaka, Nwachinemere, & Obeagu, 2018). Their findings further confirm the prevalence of microorganisms in the region, with sexually active individuals and women within the youth age having more disease infections.For instance, Usanga et al. (2009) reported a high *T. vaginalis* among pregnant women in southeast Nigeria.Umeaku et al. (2019) also foundbothT. vaginalis and *C. albicans* among pregnant women in Onitsha. Sunday-Adeoye et al. (2010) revealed the incidence of the diseases among pregnant women in Ebonyi State. Also, Udoh et al. (2020)confirmed the prevalence of these infections among Ebonyi State students.However, while*C. albicans* and*T. vaginalis* have been established within the southeast region. Not many studies have been dedicated to investigating the effect of health outcomes on the disease. Therefore, the purpose of this study is to examine the roleof certain health outcomes such as diabetes, hypertension, prolonged use of antibiotics, and use of contraceptives on this disease.

Previous research has reported the effect of diabetes on the prevalent of the infection. For instance, Younis and Adela (2016) found the highest rate of infection in diabetic women. Sato et al. (2017) correlated hypertension and C. albicans infection. McCool, Mai, Essmann, and Larsen (2008), while Yusuf, Chowdhury, Sattar, and Rahman (2007), found a strong association between contraceptives and the prevalence of vaginal infection by Candida species. These related health conditions and their association with *C. albicans* have not been well researched in Nigeria's South-East, thereby justifying the current study.

Method: -

This study adopted a cross-sectional survey. Pregnant women attending ante-natal in four public health institutions in Ebonyi and Anambra State constituted the population of the study. Three hundred and twenty-three (*n*=323) pregnant women participated in the study. They were drawn from the ante-natal unit in the selected health care institutions.

Sample collection and Analysis

The vaginal swabs from the participants were collected with the aid of doctors providing ante-natal care to them. Although, the participants were briefed on the study's objective. Also, the participants completed a self-report measure ascertaining their health conditions such as diabetes, hypertension, prolonged use of antibiotics, and use of contraceptives.

Sample Analysis

The samples of vaginal discharge were analyzed according to the method described by (Udoh, et al., 2020)

Result: -

Table 1: - Shows the outcome of the test conducted on the collected samples from the participants.

Test result	N	%
Candidiasis	113	33.6
Trichomoniasis	17	5.1
Non-infected	206	61.3
Total	336	100

The above table shows the total number of infected and non-infected participants. A total of one hundred and thirteen (*n*=113), representing 33.6% of the study's total population, tested positive for candidiasis caused by the *C. albicans.* Seventeen (*n*=17) of the population (5.1%) tested positive for *T. vaginalis*. In contrast, two hundred and six (n=206) representing (61.3%) tested negative for both diseases.

Table 2: - Shows the distribution of the participant's health outcomes and the type of infection detected.

Participant's health outcomes	Type of infection	N	%
Diabetes	Candidiasis	3 ± 2.01	0.9
Hypertension	Candidiasis	5 ± 3.01	1.5
Contraceptive use	Candidiasis	76 ± 38.50	22.6
Prolonged use of anti-biotics	Candidiasis	46 ± 23.50	13.7

The above table shows the data on the participants' reported health dispositions and type of infection diagnosed. Diabetes (0.9%), hypertension (1.5%), use of contraceptive (22.6%) and prolonged use of antibiotic (13.7%).

Discussion: -

The purpose of the current study was to investigate the role of diabetes, hypertension, prolonged use of antibiotics, and contraceptives on pregnant women with *C. albicans* and *T. vaginalis* infections. A total of three hundred and thirty-six vaginal specimens were collected from pregnant women through their consulting physicians. The test result revealed that only one hundred and thirteen of the total vaginal specimens tested positive for *C. albicans*, while seventeen tested positives for *T. vaginalis*. However, data from the questionnaire relating to health outcomes revealed that mostly the reported health positions were from the participants diagnosed with candidiasis. Only a few with trichomoniasis reported any of the health outcomes. Firstly, the findings further align with previous studies (e.g., Umeaku et al., 2019;Uneke et al., 2006; Ogomaka et al., 2018; Amadi & Nwangbo, 2013), who confirmed the incidence of the diseases among pregnant women in the southeast of Nigeria. The potential risk factor associated with these diseases and the remedial recommendations has been widely reported (e.g., Abdul-Aziz et al., 2019; Bolumburu et al., 2020; Konadu et al., 2019; Gor, 2018; Glehn, Ferreira, Da Silva, & Machado, 2016). For instance, Payne, Cécile, Cedric, Nadia, and José (2020), attributed the high prevalence of these infections to the anatomy of the female vaginal organ, which favors penetration and the installation of the disease and poor personal hygiene.

Furthermore, the study found a correlation between certain health conditions such as diabetes and hypertension in *C. albicans* infections. Thereby further supporting previous findings (e.g., Younis & Adela, 2016;Sato et al., 2017). However, the relationship was minimally correlated in this study. Perhaps, the observation is attributed to the low number of samples tested. Other health outcomes occasioned by lifestyles, such as continued use of antibiotics, were primarily correlated with the infection. This revelation supports the report of McCool et al. (2008). Accordingly, consistent with Yusuf et al. (2007), the findings also revealed the correlation between contraceptives and the disease infection.

Conclusion: -

The present study was aimed to examine the role of certain health conditions on the prevalence of *C. albicans* and *T. vaginalis*. Consequently, *T. vaginalis* was not included in the health outcome-prevalence relation due to insufficient samples. The findings indicate that the incidence of the infections persists in the area of study. At the same time, the assumption that health outcomes such as diabetes, hypertension, prolonged use of antibiotics, and use of contraceptives could moderate the prevalence of the infections were found to be true. Although, the inclusion of diabetes and hypertension in the correlation model is not explicit. However, it is concluded that the aforementioned health issues influence the prevalence of infections. Notwithstanding, it is pertinent to report the weakness of the study. For instance, the sampling method limits the findings from been generalized. However, the study recommends that robust investigation be dedicated to understanding the related factors associated with the prevalence of the infection and possible amelioration measures.

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