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Behavioural Practices and Associated Vaginal Infections Complaints among Pregnant Women Attending Antenatal Care at General Hospitals: A Cross-sectional Survey

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Abstract: *Vaginal infection is alteration in vaginal microbiota, caused either by introduction of an organism or a disturbance that allows normally present pathogens to grow. The study assessed the behavioural practices and associated vaginal infections complaints among pregnant women attending antenatal care at general hospitals in Ebonyi State, Nigeria. This cross-sectional survey utilized a 43-item (Behavioural Practices α = 0.91; Associated Risks of Vaginal Infection α = 0.82) questionnaire to study 391 pregnant women attending antenatal care. Data were analyzed with IBM SPSS version 25. Mean, standard deviation, Spearman Brown correlation, ANOVA, t-test and multiple regressions were applied in data analysis. Statistical significance was set at a p-value of less than 0.05. Results revealed positive correlation between associated risks and specific behavioural practices (toilet behaviour, bathing behaviour, clothing behaviour, and sexual behaviour, $p < 0.001$). The relationship between associated risks and overall behavioural practices ($p < 0.001$) was significant. No significant differences were observed in behavioural practices and associated risks. None of the socio-demographic characteristics of the subjects predicted associated risks of vaginal infections. Behavioural practices had high predictive values of associated risks of vaginal infection among the participants especially bathing behaviour. Behavioural practices and associated risks results showed a positive relationship based on age but educational level, occupation, marital status and location did not predict associated risks of vaginal infections. The findings suggest the need to counsel pregnant women on personal hygiene during antennal visits.*
Keywords: Behavioural practices, vaginal infections, pregnant women, antenatal care, Nigeria

INTRODUCTION

Women are likely to be at risk of complications from abnormal vaginal discharges. The discharges are in terms of quantity, color and odor which may be considered as an outcome of infection (Nalini, 2012). The discharge is characterized by irritation and itching which may eventually cause distress and discomfort among women (Mandell, Bennett, and Dolin, 2010). Vaginal infection (VI) is alteration in the vaginal microbiota, caused either by the introduction of an organism or by a disturbance that allows normally present pathogens to multiply (Nalini, 2012). There is a high risk of death and disability associated with vaginal infections, which are defined as inflammatory conditions of the vagina (Hacer, Reyhan, and Sibel, 2012). Itching, burning, irritation, and pain are some of the symptoms that may arise from abnormal vaginal discharge. These symptoms are common and frequent complaints among reproductive age women attending antenatal clinic (Adeyba, Adeoye, and Adesiji, 2003). *Trichomonas vaginalis*, *Candida albicans* and *Bacterial vaginosis* are the commonest causes of vaginal infections (Nalini, 2012). As a consequence of inappropriate behavioural patterns, the vagina, the ectocervix, and the endocervix are all susceptible to experiencing infections. The squamous

epithelium of the vagina and the ectocervix are vulnerable to infections caused by Candida and Trichomonas, but the columnar epithelium of the endocervix is sensitive to infections caused by Neisseria and Chlamydia. This is an important distinction to make.

Behavioural practices, especially faulty ones, are any particular behaviour or behaviour pattern which strongly increases the chances of developing a disease, disability or syndrome (Pam, 2013). They are conceived as attributes or characteristics of an individual that increase the likelihood of developing a disease or injury (Oakeshott, 2002). In this study, behavioural practices are any act exhibited by pregnant women that might increase the chances of vaginal infection. Such behavioural practices include toilet behaviour, bathing behaviour, behaviour related to clothing and sexual behaviour (Mascarenhas, Machado, and Costa, 2012).

Toilet behaviours include wiping back to front or mixed after urinating or defecating, wiping with hand and not drying hand after washing (Mascarenhas, Machado, and Costa, 2012). Bathing behaviour practices include bathing by sitting on the ground, on the stool, toilet seat, bathing once a day or not bathing at all and no shower during menstruation. Sexual behaviours are wearing tight fitting underwear, wearing unwashed underwear; wearing wet underwear and wearing underwear for 2-3 days without washing them. Sexual behaviours also include such practices like vaginal douching, oral sex, anal sex and use of vaginal toy. These practices may affect numerous aspects of a woman's gynecological and reproductive health, such as increase risk of cervicitis, endometritis, upper genital tract infection, ectopic pregnancy, premature or low-birth weight delivery, pre-term labor and infertility (Black, and Short, 2017). According to the findings of a study conducted by Mascarenhas, Machado, and Costa (2012), the behaviours have been seen to increase the incidence of preterm birth, amniotic fluid infection, and premature rupture of membranes, cervical cancer, and pelvic inflammatory disease among pregnant women.

Behavioural practices and risk of vaginal infections might depend on some socio-demographic variables of women like age, educational level, parity, occupation and location of residence. As regards age, Nalini reported that the behavioural practices were more accommodating among older women than younger ones (Nalini, 2012).

For level of education, it has been reported that women who reached secondary level of education were significantly less likely to have abnormal vaginal discharge when compared to those who reached post-secondary level of education. Furthermore, it was observed that the degree of education was substantially connected with abnormal vaginal discharge among women who were visiting health care facilities in the state of Imo (Uwakwe et al., 2018). Nalini (2012) reported that faulty behavioural practices were observed more among women with higher education than among women with no formal education or only with primary education.

As regards parity, it was reported that women with children numbering 4-5 and above had better and more accommodating behavioural practices than those with 1-3 children (Stone, Ingham, and Simkhada, 2003). Authors reported that women with 4 children and above had

bad more pleasant behavioural practices compared with the younger ones with 1-2 children (Vaca, Guadalupe, and Erazo, 2010). According to Uwakwe et al. (2018), it was hypothesized that the factors that contributed to abnormal vaginal discharge were more prevalent in women who lived in urban areas as opposed to those who lived in rural areas. More so, women with at least one or more children when compared with women with no children were less likely to have abnormal vaginal discharge, though this was only significant with women who had one child or more than five children.

A study reported that women who lived in urban area were involved in high risk behaviours such as having oral sex, anal sex, use of sex toll to enhance sex, applying of powder around the vaginal areas and having multiple sexual partners (Bro, 2013). It was further reported that place of residence was significantly associated with abnormal vaginal discharge (Uwakwe et al., 2018).

Douching, the use of an intrauterine device, the absence of condom use, and smoking are all examples of behaviours that are common among women (Hellberg et al., 2000; Sara et al., 2018). According to Hellberg et al. (2000), other variables that have been linked to vaginal infections (VI) include having a low socio-economic position, having poor personal hygiene, having HIV infection, and having sexually transmitted infections (STIs), and most often trichomoniasis. A study revealed that the practice of inserting materials into the vagina to enhance dry or wet sex was a common risk factor for VI among women of reproductive age (Prosper et al., 2012). Women of reproductive age are those within the age of 15-49 years. In this study, WHO's model was adopted as ideal (World Health Organization. 2012).

Empirically, behavioural practices associated with VI have been reported. For example, it was reported that unsatisfactory practices such as poor use and lack of care of undergarments among women encourage the growth of VI. It is necessary to note that most women in this part of the globe do not wear undergarments and even if they use them, in view of the cultural practices, they have the habit of drying them indoors when washed. Also, a high proportion of women still use folded cloths and often reuses same during menstruation (Nalini, 2012). A similar study recorded the occurrence of unhygienic practices (2.73%) and improper menstrual care (6.28%) among women (Thulkar et al., 2010). A study conducted by Department of Health and Rural Development of Tamil Nadu State of India in 2010 identified that only 9% women use sanitary products available in the market. In Nigeria, a research reported that majority of the women attending hospitals in Imo State had coexisting gynaecological complaints (76.2%), of which 41.3% and 38.8% experienced itching around the vulva and lower abdominal pain, respectively (Uwakwe et al., 2018).

Globally, it was affirmed that vaginal infections affect approximately 57-180 million reproductive age women, with the majority living in developing countries (Chalechale, and Karimi, 2010). Another study confirmed that infectious vaginitis is responsible for ninety per cent of all cases of vaginal infections that occur in women who are of reproductive age. Furthermore, it was found that approximately seventy-five per cent of women of reproductive age may experience at least one vaginal infection in their lifetime as a consequence of

engaging in risky behaviours (Chalechale, and Karimi, 2010; Hayat et al., 2015). If the infection is not treated, it may result in pelvic inflammatory disease (PID), which can lead to long-term complications such as tubal infertility, ectopic pregnancy, reproductive dysfunction, and unfavorable pregnancy outcomes (such as premature labor and delivery and low birth weight) (Prospero, 2014). All of these complications can be avoided by receiving treatment for the infection.

Women who experience the above reproductive health issues might compromise their health. Indeed, the social stigma including feeling of guilt, shame and cultural barriers might prevent women whose health has been compromised from seeking medical help. Hence, the assessment of the behavioural practices among women would lend a hand for identifying these unhealthy practices that have been incriminated for vaginal infections. Based on the awareness on this issue, the need for healthy practices may be created, thus, improving the health and wellbeing of the women. Additionally, this has the potential to shatter the "culture of silence" that prevents these ladies from disclosing intimate issues of this kind to many other people. It has been observed that women of reproductive age who go to prenatal clinics often complain about abnormal vaginal discharge.

It is quite obvious that during this period of reproductive age, significant changes might occur in the vaginal area and it is possible that women might exhibit some behavioural practices which could increase their susceptibility to vaginal infections. The main purpose of this study was to ascertain the behavioural practices and associated risks of vaginal infection complaints among pregnant women attending antennal care at general hospitals in Ebonyi State, Nigeria.

Hypotheses

To establish relationship between behavioural practices and associated risks in relation to socio-demographic characteristics (age, educational level, occupation, marital status, parity and location); to establish differences in behavioural practices in relation to socio-demographic characteristics; to test differences in associated risks in relation socio-demographic characteristics, and to establish the predictive values of behavioural practices, associated risks and socio-demographic characteristics (age, educational level, occupation, marital status, parity and location) of the pregnant women.

METHODOLOGY

Design, participants and setting

In the month of March 2023, we initiated this cross-sectional survey which was completed in the month of July of the same year on a sample of 391 pregnant women attending antenatal care in general hospitals in Ebonyi State, Nigeria. The sample was calculated using Taro Yamane (Yamane, 1973) formula for determining sample size as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size
N = number of people in the population = 18,012
e = allowable error (%) = 5% = 0.05
Substituting figures in the formula

$$n = \frac{18012}{1 + 18012(0.05)^2}$$

$$n = \frac{18012}{1 + 18012(0.0025)}$$

$$n = \frac{18012}{1 + 45.03}$$

$$n = \frac{18012}{46.03}$$

= 391.310… Approximately 391.
The sample is in line with the rule of the thumb that suggests that when the population of a study is in several thousand, a proportion of 1-2% or less is ideal to be used (Nwana, 2014).

Questionnaire

The study used a researchers-developed 43-item Behavioural Practices and Associated Risks of Vaginal Infection Questionnaire (BPARVIQ). The items in the questionnaire were gathered from literature on behavioural practices and associated risks of vaginal infection. The questionnaire consisted of two sections; sections A and B. Section A contained six items on personal data of respondents. Section B contained 37 items that elicited information on behavioural practices and associated risks of vaginal infection. Five experts from two institutions of higher learning in South East region of Nigeria were used for validating the BPARVIQ. Thirty pregnant women attending antenatal care at general hospitals in Enugu State responded to the research tool for data quality control. The data yielded high Cronbach alpha (Behavioural Practices $\alpha = 0.91$; Associated Risks of Vaginal Infection $\alpha = 0.82$) reliability coefficients. The reliability coefficients were higher than a criterion of 0.70 acceptable for good instruments (Cohen, Manion, and Morrison, 2018).

The permission to administer the survey on the women in each hospital setting was granted by the chief medical director (CMD) before data collection. Each individual copy of the BPARVIQ was accompanied by a permission statement that included a description of the study goal, the manner of response, and an assurance that the participants would remain anonymous. During the time that the participants were filling out their copies of the survey, the researchers remained present on the premises during the process of responding to the questionnaire. This procedure was used in order to avoid any potential communication that

may have occurred beforehand. The women were allowed 35 minutes during the antenatal visit to respond to the copies of the BPARVIQ and return them immediately.

Inclusion and exclusion criteria

Pregnant women who accepted to participate in the survey were recruited to participate in the study. They read the consent form attached to the questionnaire and willingly accepted to take part. The women who refused to take part in the study were excluded.

Data analysis

The copies of the BPARVIQ that were finished were analyzed and any copies that had incomplete responses were thrown away. There were 391 copies of the BPARVIQ that were administered; however, only 275 copies, which represent about 70.3% of the total, were utilized for the analysis of the data. Percentages, Spearman Brown correlation coefficient and mean scores were used to describe behavioural practices and associated vaginal infections complaints. In describing the respondents' behavioural practices and associated vaginal infections complaints, a mean score of 2.50 and higher was adjudged negative practice and positive complaint and a mean score of less than 2.50 was adjudged positive practice and negative compliant. Standard deviations were used to examine how the responses given by the participants varied. In determining the strength of the relationship, r value of 0.10 to 0.29 was considered low relationship, r value of 0.30 to 0.49 was adjudged moderate relationship, r value of 0.50 to 0.99 was considered high and r value of 1.0 was considered perfect relationship (Pallant, 2011). Analysis of variance (ANOVA) and t-Test were computed to determine whether differences observed in mean responses were significant in relation to the participants' socio-demographic characteristics. Stepwise multiple regression analysis was run in order to observe the predictive power of independent variables on behavioural practices and associated vaginal infections complaints. An alpha level of 0.05 was set for the entire hypotheses. Analysis of data was done with IBM SPSS version 25.0 for windows.

RESULTS

Table 1: **Socio-demographic Characteristics of Pregnant Women (N = 275)**

Variables	Frequency (f)	Percentage (%)
Age (years)		
15-25	88	32.0
26-30	110	40.0
31-49	77	28.0
Educational level		
No formal education	49	17.8
Primary education	81	29.5
Secondary education	77	28.0
Tertiary education	68	24.7
Occupation		
Civil servant	71	25.8
Farmer	96	34.9
Trader	65	23.6
Housewife	43	24.7
Marital status		
Married	83	30.2
Single	101	36.7
Divorced	91	33.1
Parity		
1	46	16.7
2	71	25.8
3	58	21.1
4	49	17.8
5 and above	51	18.5
Location of residence		
Urban	121	44.0
Rural	154	56.0

A total of 275(about 70.3% return rate) pregnant women who participated in the study returned usable copies of the questionnaire. The mean age of women was 30.5 years with a standard deviation (SD) of ± 2.11 years. One hundred and ten (40.0%) respondents belonged to 26-30 years age group. Eight one (29.5%) and 77(28.0%) respondents attained primary and secondary education, respectively. Furthermore, 96(34.9%) were farmers and a little more than one quarter (26.8%) were civil servants. One hundred and one (36.7%) were single and 91

(33.1%) were divorced. However, 71(25.8%) had two children and 58(21.1%) had three children. More than half (56.0%) lived in the rural area (Table 1).

Table 2: **Summary of Pearson Correlation of Relationship between Behavioural Practices and Associated Risks**

Variables	Mean	SD	Associated Risks
Toilet Behaviour	2.07	0.58	
Pearson Correlation			0.381**
			p < 0.001
Bathing Behaviour	2.00	0.55	
Pearson Correlation			0.376**
			p < 0.001
Clothing Behaviour	2.21	0.58	
Pearson Correlation			0.351**
			p < 0.001
Sexual Behaviour	2.07	0.53	
Pearson Correlation			0.304**
			p < 0.001
Behavioural Practices (BP)	2.25	0.37	
Pearson Correlation			0.542**
			p < 0.001
Associated Risks	2.24	0.42	
Pearson Correlation			1
			-

** Correlation is significant at p < 0.001

The summary of Pearson correlation of relationship between behavioural practices and associated risk is shown in Table 2. The data show positive correlation coefficient scores that range from 0.304-0.542 indicating moderate to low relationship. The relationship between associated risks and specific indices of behavioural practices (toilet behaviour r = 0.381, bathing behaviour r = 0.376; clothing behaviour r = 0.351, sexual behaviour r = 0.304) are significant and relationship between associated risks and overall behavioural practices (r = 0.542) is also significant.

Table 3: **Summary of Mean, ANOVA and t-Test Analysis on Behavioural Practices**

Variables	n	Mean	SD	Obtained value	p-value
Age (years)					
15-25	88	2.19	0.31		
26-30	110	2.26	0.33	F = 1.481	0.229
31-49	77	2.29	0.46		
Educational level					
No formal education	49	2.30	0.42		
Primary education	81	2.26	0.32	F = 1.245	0.294
Secondary education	77	2.26	0.41		
Tertiary education	68	2.18	0.32		
Occupation					
Civil servant	71	2.21	0.37		
Farmer	96	2.24	0.34	F = 0.563	0.640
Trader	65	2.25	0.40		
Housewife	43	2.30	0.35		
Marital status					
Married	83	2.26	0.40		
Single	101	2.19	0.30	F = 1.709	0.183
Divorced	91	2.29	0.39		
Parity					
1	46	2.15	0.36		
2	71	2.23	0.31		
3	58	2.29	0.38	F = 1.255	0.288
4	49	2.29	0.36		
5 and above	51	2.27	0.42		
Location of residence					
Urban	121	2.25	0.38	t = 0.072	0.943
Rural	154	2.24	0.35		

Table 3 shows the summary of ANOVA and t-Test analysis of behavioural practices in relation to socio-demographic variables of respondents. The data show that there are no significant differences in behavioural practices in relation to age ($F = 1.481$, $p > 0.05$), educational level ($F = 1.245$, $p > 0.05$), occupation ($F = 0.563$, $p > 0.05$), marital status ($F = 1.709$, $p > 0.05$), parity ($F = 1.255$, $p > 0.05$) and location of residence ($t = 0.072$, $p > 0.05$).

Table 4: **Summary of Mean, ANOVA and t-Test Analysis on Associated Risks**

Variables	n	Mean	SD	Obtained value	p-value
15-25	88	2.23	0.41		
26-30	110	2.20	0.35	F = 1.609	0.202
31-49	77	2.31	0.49		
Educational level					
No formal education	49	2,29	0.49		
Primary education	81	2.22	0.37	F = 0.969	0.408
Secondary education	77	2.28	0.45		
Tertiary education	68	2.18	0.36		
Occupation					
Civil servant	71	2.24	0.47		
Farmer	96	2.25	0.37	F = 0.123	0.947
Trader	65	2.21	0.46		
Housewife	43	2.26	0.37		
Marital status					
Married	83	2.29	0.46		
Single	101	2.22	0.35	F = 0.832	0.436
Divorced	91	2.22	0.44		
Parity					
1	46	2.23	0.44		
2	71	2.26	0.43		
3	58	2.22	0.35	F = 0.181	0.948
4	49	2.22	0.40		
5 and above	51	2.27	0.45		
Location of residence					
Urban	121	2.23	0.43	t = 0.216	0.829
Rural	154	2.24	0.41		

Table 4 shows the summary of ANOVA and t-Test analysis of associated risks in relation to respondents' socio-demographic characteristics. The data show that the differences observed in associated risks in relation to socio-demographic characteristics of study participants are not significant ($p > 0.05$).

Table 5: **Summary of Multiple Regression Analysis of Behavioural Practices and Associated Risks**

Variables [a,b]	**R**	**R^2**	**β**	**SE**	**t**	**p**	**95% CI for B**	
							Lower Bound	**Upper Bound**
Toilet Behaviour	0.381	0.145	0.274	0.049	6.816*	0.000	0.195	0.353
Bathing Behaviour	0.376	0.142	0.284	0.042	6.714*	0.000	0.200	0.367
Clothing Behaviour	0.351	0.123	0.251	0.041	6.186*	0.000	0.171	0.331
Sexual Behaviour	0.304	0.093	0.239	0.045	6.277*	0.000	0.150	0.329
Behavioural Practices	0.542	0.294	0.617	0.058	10.663*	0.000	0.508	0.731

a. **Predictor variables (BP)†**
b. **Dependent variable (Associated Risks)**

†BP = Behavioural Practices
*Significant at $p < 0.05$

It is shown in Table 5 that the multiple regressions (R) value for toilet behaviour is 0.381, which indicates a positive link. Additionally, the t-value is 6.816 for this analysis. Given that the p-value is lower than $p = 0.05$, it may be concluded that there is a statistically significant connection between toilet activity and the dangers that are connected with it. According to the regression weight β value of 0.274, which accounts for 27.4% of the variance in the model, it can be concluded that the predictive value of related hazards among the respondents is quite low. Bathing behaviour follows the same trend but tends to contribute higher variance (28.4%) in the model. When BP is considered as a unit, it tends to contribute about 61.7% variance in the model indicating a high predictive value of associated risks among the study participants. The relationship between other indices of behavioural practices and associated risks vaginal infections of the participants are significant showing that individual indices of BP could predict associated risks.

Table 6: **Summary of Multiple Regression Analysis of Behavioural Practices, Associated Risks and Demographic Characteristics of Pregnant Women**

Variables [a,b]	**R**	**R^2**	**β**	**SE**	**t**	**p**	**95% CI for B**	
							Lower Bound	**Upper Bound**
Age	0.101	0.010	0.047	0.028	1.672	0.098	0.008	0.103
Educational level	0.102	0.010	0.036	0.021	1.697	0.091	0.077	0.006
Occupation	0.073	0.005	0.026	0.022	1.204	0.230	0.017	0.069
Marital status	0.036	0.001	0.017	0.028	0.600	0.549	0.038	0.071

Parity	0.105	0.011	0.028	0.016	1,746	0.062	0.004	0.060
Location of residence	0.004	0.000	0.003	0.044	0.072	0.943	0.091	0.084
Variables [c,d]								
Age	0.071	0.005	0.038	0.032	1.172	0.242	0.026	0.102
Educational level	0.060	0.004	0.024	0.024	0.995	0.321	0.071	0.023
Occupation	0.003	0.000	0.001	0.025	0.057	0.955	0.050	0.047
Marital status	0.068	0.005	0.035	0.032	1.118	0.265	0.097	0.027
Parity	0.016	0.000	0.005	0.018	0.265	0.792	0.031	0.041
Location of residence	0.013	0.000	0.011	0.051	0.216	0.829	0.089	0.110

a. **Demographic Characteristics (Predictor)**
b. **BP (Dependent variable)†**
c. **Demographic Characteristics (Predictor)**
d. **Associated Risks (Dependent variable)**

†BP = Behavioural Practices

Given that the multiple regression (R) value for age is 0.101, which indicates a positive link, and that the t-value is 1.672, the p-value is larger than p = 0.05, which indicates that there is no significant relationship between behavioural practices and the age of the respondents, the results shown in Table 6 indicate that there is no significant relationship between the two. Based on the regression weight β value of 0.047, which accounts for 4.7% of the variance in the model, it can be concluded that the predictive value of behavioural practices in relation to the age of the participants is very low. There is a tendency for the subjects' educational level to contribute 3.6% to the model, which indicates that the predictive index of behavioural practices is often low. The fact that there is no significant association between the other characteristics of the participants and their behavioural practices demonstrates that the socio-demographic features of the subjects are not capable of predicting their behavioural practices. The same trend appears to hold sway with regard to characteristics of the participants and associated risks showing that socio-demographic characteristics of the subjects do not predict associated risks.

DISCUSSION

Data on the pregnant women's socio-demographic characteristics showed that majority (40.0%) were in the 26-30 years age group. This proportion was not amazing because, in the present day Nigeria, most females marry early and are expected to experience high fertility at this age. The proportion of the women who attained primary education was not also amazing based on the finding that women in the area under survey are given out for marriage mostly

after primary education (Anikwe et al., 2020). The area covered in the study is an agrarian society; therefore, it was not surprising that most (34.9%) pregnant women studied were farmers. It was amazing that more (36.7%) pregnant women studied were single; however, this might be as a result of rising cases of out of wedlock pregnancies among the present population of women in the area. The finding that a greater proportion (25.8%) of the women had 2 children was a welcome development based on popular observation that most Nigerian women; before the age of 30 years, must have had about 5 or more children because of short child-spacing period and none adoption of family planning. The area under survey is mainly made up of rural communities; therefore, the finding that the majority (56.0%) of the women lived in the rural area was not surprising. The finding did not corroborate those of a previous study whose subjects were more in the urban than in the rural area (Nwimo et al., 2022).

Results of the study showed a positive moderate relationship between behavioural practices and associated risks. The relationship between associated risks and specific indices of behavioural practices (toilet behaviour r = 0.381, bathing behaviour r = 0.376; clothing behaviour r = 0.351, sexual behaviour r = 0.304) are significant and relationship between associated risks and overall behavioural practices (r = 0.542) was also significant. These results lend credence to what previous studies reported. For instance, a study reported that behaviours related to toilet hygiene such as wiping behaviour (wiping from back to front) and washing perineal area with bare hand after defecation were found to be particularly important risk factors for vaginal infections (Sezer, and Taskin, 2010). Authors reported that behavioural practices had significant relationship with risk factors of vaginal infections among women aged between 15-49 years in health centres in Ankara (Kisa, and Taskin, 2007). The significant relationship existed between behavioural practices such as toilet behaviour, bathing behaviour, clothing behaviour and sexual behaviour and virginal infections among Turkish women (Karaer, Boylu, and Avsar, 2005).

Results further showed that there were no significant differences in behavioural practices in relation to age ($p > 0.05$), educational level ($p > 0.05$), occupation ($p > 0.05$), marital status ($p > 0.05$), parity ($p > 0.05$) and location of residence ($p > 0.05$). These findings corroborate those of a previous study that revealed no statistically significant difference in the behavioural practices among women in relation to age; educational level and employment status in Coastal Peru (Leon et al., 2009). The findings equally lend credence to a study that discovered no significant differences in the risk factors associated with vaginal infections among pregnant women in Jamaica (Kamara et al., 2000).

Results indicated that differences in associated risks of vaginal infections in relation to socio-demographic characteristics of study participants are not significant ($p > 0.05$). These findings are not surprising based on the fact that it is possible that the subjects studied exhibited some practices which could increase susceptibility to vaginal infections. The findings attest to the fact that women with abnormal vaginal discharge usually would not present the discharge as a complaint, unless it is very uncomfortable to the extent of preventing performance in routine activities (Li et al., 2010). The findings tend to be in agreement with a study which reported

that educational level, age, marital status and employment status of women did not associate with vaginal infections (Mascarenhas, Machado, and Costa, 2012).

Data revealed that behavioural practices had a high predictive value of associated risks of vaginal infection among the participants especially in bathing behaviour which contributed a high variance (28.4%) in the regression model. This unhygienic practice could result in infections and increased local skin irritations around the vulva and pubic area, thereby explaining the increased relative occurrence of vulva itching and other gynaecological complaints like lower abdominal pain, vaginal bleeding, dysuria, genital swelling, dyspareunia and dysmenorrheal; most often presented by women attending antenatal clinic. A number of studies have shown that behavioural practices predict risks of vaginal infections. For instance, a study reported that behavioural practices predicted risks of vaginal infection among women aged between 15-49 years who applied to MCH/FP center in Ankara (Kisa, and Taskin, 2007). Similarly, it was reported that behavioural practices predicted risk of vaginitis in Turkish women (Hacer, Reyhan, and Sibel, 2012)). More so, results of the present study indicated that the relationship between other indices of behavioural practices and associated risks of vaginal infections among the participants are significant showing that individual indices of BP predicted associated risks as previously reported (Karaer, Boylu, and Avsar, 2005).

Multiple regression analysis of behavioural practices and associated risks results showed a positive relationship based on age. This finding is similar to that which reported that age has positive significant relationship with behavioural practices and associated risk of vaginal infection (Vaca, Guadalupe, and Erazo, 2010). Findings of the present study showed that relationship between behavioural practices and socio-demographic characteristics of the subjects such as age, level of education, marital status and location of residence was not significant indicating that the socio-demographic characteristics of the subjects did not predict behavioural practices. These findings are in agreement with an earlier study which reported that age and level of education separately did not foresee the incidence of herpes simplex virus type 1 and 2 infections and co-infections amongst USA adults (Hind, Jessica, Adel, and May, 2010) but corroborate those of a previous research which reported that educational status and place of residence were significantly associated with urinary tract infection among pregnant women attending antenatal care at Wachemo university comprehensive specialized hospital (Ezo et al., 2024). The findings did not corroborate those of a previous research which reported that educational level, place of residence and parity were the factors that are predictive of abnormal vaginal discharge in women who are patients at health care facilities in the state of Imo in Nigeria (Uwakwe et al., 2018).

Results further showed that socio-demographic characteristics of the subjects (age, educational level, occupation, marital status and location) did not predict associated risks of vaginal infections. This suggests that there might be other factors that could predict gynaecological complaints among women in Ebonyi State. The implication is that gynecologists need to implement counseling activities and recommendations to share with patients, as well as tips on how to avoid some behavioural practices that could predispose them to health problems.

Limitations of the study

The data for the research was collected via the use of a questionnaire completed using paper and pencil. It was not possible for the researchers to have any control over the information that was provided by the respondents. Therefore, results of the study might not be used in making awesome generalizations regarding other pregnant women in this country and elsewhere. This may be due to the fact that these women may vary significantly from one another in terms of social and other situations. The pregnant women who were researched represented a sizeable portion of the Nigerian population, and the information that was gathered would be helpful in the process of establishing prospective reproductive health education programs for schools in Nigeria as well as other emerging nations in Africa that would possibly have a culture that is comparable to Nigeria's in general and Ebonyi State in particular.

CONCLUSION

From the findings of the study, it is safe to conclude that positive moderate relationship between behavioural practices and associated risk of vaginal infections existed. However, associated risks of vaginal infection in relation to socio-demographic characteristics of study participants were not significant. Furthermore, behavioural practices had high predictive values of associated risks of vaginal infection among the participants especially bathing behaviour which contributed high variance in the regression model. More so, behavioural practices and associated risks results showed a positive relationship based on age but educational level, occupation, marital status and location of residence did not predict associated risks of vaginal infections. This suggests that there might be other factors that could predict gynecological complaints among the women. The study therefore, recommended that gynecologists should screen all pregnant women for vaginal infections at each clinic visit during pregnancy and counsel about vaginal infection prevention and ensure women with reactive tests (and their partners) are treated. Health educators and other allied health professionals need to counsel women in changing behaviour, promote health educational programs through different media in order to induce proper vaginal hygiene and advice women presenting vaginal infections about completing full course of treatment and referring partners for treatment.

Abbreviations

VI: Vaginal Infections; WHO: World Health Organization; BPARVIQ: Behavioural Practices and Associated Risks of Vaginal Infection Questionnaire; n: Sample size; N: Number of people in the population; e: Allowable error; CMD: Chief Medical Director; SD: Standard Deviation; ANOVA: Analysis of Variance; USA: United States of America.

Declarations

Ethics consideration

A University Research Ethics Committee decided not to need ethical clearance for the study. This exemption was granted due to the fact that the research was not conducted in a laboratory setting.

Informed consent

Before providing their responses to the questionnaire, the participants were given the opportunity to provide their written informed permission. Before responding to the survey for the study, the participants read the permission letter and indicated that they were willing to take part in the research.

Consent for publication

The authors have the consent of the participants to publish the findings of the study.

Author contribution(s)

Each author significantly contributed to the article in some way, whether it was with the idea, the study's design, and the execution, the collection of data, the analysis, or the interpretation of the results. Each author also helped with the manuscript's draught, revision, and critical review, as well as providing final approval for the publication edition, agreeing on the journal to which the article was submitted, and accepting responsibility for the article in its entirety.

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Availability of data and materials

This article provides access to the study's data.

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