



Awareness and knowledge of the pelvic inflammatory disease, its risk factors and diagnostic procedures among female undergraduates in tertiary institutions in Rivers State, Nigeria

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ABSTRACT

Aims: This study was designed to evaluate awareness and knowledge of pelvic inflammatory disease (PID), its risk factors and diagnostic procedures among female undergraduates in tertiary institutions in Rivers State, Nigeria.

Methodology and results: A questionnaire-based survey design was conducted among 325 undergraduate students. Completed questionnaires were retrieved immediately. Descriptive and inferential (chi-square test) statistical tools were used for data analysis. Out of the 325 respondents, 186(57.2%) had heard of PID, 162(49.8%) did not know the possible risk factors of PID, 161(49.5%) perceived their awareness level of PID to be poor, while 30(9.2%) had good awareness level of PID. The majority 185(56.9%) of the respondents, do not know the mode of transmission of PID. There was a statistically significant relationship between the student's age and the level of awareness statement at ($p < 0.05$). On the student's knowledge, only the statement: Do you know PID could be symptomless, showed a statistically significant relationship with the student's course of study ($\chi^2 = 12.815$, $p = 0.00$).

Conclusion, significance and impact of study: Most respondents have heard of PID via social media and seminars and have even seen those who had the disease. They still claim that their awareness level was poor since they do not know the mode of transmission and ill effects of PID, and so they cannot be protected against the disease. A sensitization campaign on risk factors, symptoms and mode of spread of the disease has to be carried out in the institutions to save the students at high risk of the infection.

Keywords: Infection, laboratory test, pelvic inflammatory disease, students, ultrasound

INTRODUCTION

Pelvic inflammatory disease (PID) is a polymicrobial disease condition that affects mainly the upper genital tract in women, which includes but is not limited to; parametritis, endometritis salpinges, tubo-ovarian abscess and peritonitis (Crossman, 2006). The spectrum of PID ranges from subclinical to severe life-threatening illness with several complications/sequelae, such as chronic pelvic pain, ectopic pregnancy and infertility (Crossman, 2006).

Lower abdomen pain, fever, back pain, vomiting and genital tract infection, such as abnormal vaginal bleeding or discharge, itching and odor are symptoms of PID (Crossman, 2006).

The PID was reported to affect approximately 1.5 million women in the United States and has had a negative impact on the economy of the country, as an estimated 1.06 billion PID cases are expected each year. Oseni (2016), on his part, noted that the case was not different for Nigerian women when he reported that over 70% of female undergraduates in his study had PID.

Pelvic inflammatory disease is a severe health challenge globally, especially among women that are sexually active and a global incidence varies from 0.28% to 1.67% (Oroz *et al.*, 2012). Price *et al.* (2016), in their study conducted in England, reported that 50-75,000 women are diagnosed with PID yearly and that approximately one-third were those within the age range of 16-24 years. The symptoms of PID vary by individual,

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with some having mild symptoms while others have none (Rein *et al.*, 2000). A person may be predisposed to PID infection by several variables, including early sexual activity, several sexual partners, abuse or rape, the existence of STIs and alcohol consumption (Suss *et al.*, 2000; Crossman, 2006). According to Blake *et al.* (2003), in their study, the entire patients diagnosed clinically with PID complained of lower abdominal pain or pain with sexual intercourse as well as symptoms of lower genital tract infection.

Diagnosis of PID has historically been challenging, particularly before the development of contemporary medical laboratory and medical imaging methods. Numerous laboratory tests are utilized to assess PID, such as serum white blood cell counts, wet mount polymorphonuclear leukocytes and erythrocyte sedimentation rates (Peripert *et al.*, 1996). Different imaging modalities such as transvaginal ultrasound (Timor-Tritseh *et al.*, 1998; Molander *et al.*, 2001), computer tomography (Sam *et al.*, 2002) and magnetic resonance imaging (MRI) (Tukeva *et al.*, 1999) have been reported as imaging tools for the investigation of PID. The decision on the imaging modality to be used may be influenced by factors such as cost, accessibility and even the referring doctor's preferences. Ultrasound scanning is and less expensive modality during the initial stages of the study. However, while being more expensive than transvaginal ultrasonography, MRI has been reported to have a high sensitivity of 95% and a specificity of 89% in the diagnosis of PID (Tukeva *et al.*, 1999; Crossman, 2006).

The students, who may be future healthcare professionals, must have sufficient knowledge and awareness of PID infection, preventive measures, risk factors, causative agents, as well as the mode of diagnosis of PID to reduce and overcome the medical and psychological issues associated with PID infection. The student's sound knowledge and awareness of PID will help them to promote health education as well as apply the appropriate preventive measures.

We hypothesized that there is no significant relationship between the student's institutions of study, level of study and course of study with their knowledge and PID infection. Therefore, this study was designed to evaluate awareness and knowledge of PID, its risk factors and diagnostic procedures among female undergraduates in tertiary institutions in Rivers State, Nigeria.

MATERIALS AND METHODS

This questionnaire-based survey was conducted among female undergraduate students of Peter Adaeze Mary Odili (PAMO) University of Medical Sciences (PUMS), Rivers State University (RSU), Ignatius Ajuru University of Education (IAUE) and Rivers State College of Health Science and Management Technology (RSCOHSMAT), Rivers State, Nigeria. The study was conducted between April 2022 and June 2022. These institutions were selected based on logistic reasons and also based on the fact that they equally offer medical and health science

courses. Only students who were in school within the period of the data collection and consented to participate in this study were selected, whereas those absent from school during the period and those who did not consent to this study were excluded. The ethical approval (PUMS/REC/07.22/021) was obtained from the Research Ethics Committee of PAMO University of Medical Sciences, Port Harcourt, Nigeria. The participant's consent was duly sought and obtained using written informed consent before they participated in this study. The sample size used in this study was calculated using the formula for determining simple proportion by Abramson and Gahlinger (2002). The total number of female students in these institutions was more than 10,000. Hence, the sample size formula:

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

Where n=Minimum sample size; P=Proportion in the target population estimated to have a particular feature (a similar study by Shittu *et al.* (2007) on STI showed a prevalence of 34%; Z_{α} =Standard normal deviation, corresponding to 95% confidence level at $Z=1.96$ for a two-tailed test; d=Highest allowable difference from the true proportion; $n=[0.34(1-0.34) \times (1.96)^2]/(0.05)^2$; $n=345$. This sample size was selected using a convenience sampling technique.

A 24-items questionnaire designed by the researchers in line with the study objectives was used for data collection. The questions were drawn based on a literature search of some related studies carried out by researchers such as Folasayo *et al.* (2017) and Amu and Adegun (2015). The questionnaire consists of three sections: A, B and C. Section A captured information on the students' socio-demographic variables, section B addressed questions on the student's level of awareness and C dealt with questions on knowledge.

The validity of the questionnaire was calculated using the Index of Item Objective Congruence (IOC) method used by previous authors (Turner and Carlson, 2003; Ogolodom *et al.*, 2020; Mbaba *et al.*, 2021). The content validity of the questionnaire was assessed by calculating the IOC. According to the index parameters, an IOC score >0.6 was assumed to show excellent content validity. All the scores for all the items of the questionnaire after IOC interpretation were >0.6 in this study. Cronbach alpha reliability value of 0.92 for internal consistency of the questionnaire was obtained.

The questionnaire was generated in a hardcopy version and administered to the participants by the researchers with the aid of four research assistants recruited.

The data were collected using proforma and exported into the SPSS version 21 (IBM Corp, Armonk, NY, 2012) for statistical analysis. Descriptive (frequency, bar chart, percentage, mean) and inferential (chi-square test) statistics were the tools used for statistical analysis. The relationship between participants' socio-demographic variables and awareness and knowledge of PID was evaluated using the chi-square test at a statistical

Table 1: Socio-demographic variables of respondents.

Socio-demographic characteristics	Frequency (f)	Percentage (%)
Age group		
<20 years	160	49.2
21-30 years	163	50.2
31-40 years	1	0.3
41-50 years	1	0.3
Total	325	100.0
Institution of learning		
PUMS	157	48.3
IAUE	86	26.5
RSCOHSMAT	82	25.2
Total	325	100.0
Level of study		
100 level	52	16.0
200 level	136	41.8
300 level	72	22.2
400 level	47	14.5
500 level	18	5.5
Total	325	100.0
Religion		
Christianity	304	93.5
Muslim	11	3.4
Other	10	3.1
Total	325	100
Marital status		
Married	23	7.1
Single	302	92.9
Divorced	-	-
Total	325	100.0
Course of study		
Pure Arts	4	1.2
Social Science	28	8.6
Science/Engineering	47	14.5
Medical/related	246	75.7
Total	325	100.0

significance level of 0.05.

Ethical approval and consent to participate

Ethical approval (PUMS/REC/07.22/021) was obtained from the Research Ethics Committee of PAMO University of Medical Sciences Port Harcourt, Nigeria. All participants gave their written informed consent.

RESULTS

Socio-demographic variables of the respondents.

Out of the 345 questionnaires administered, 325 respondents filled the questionnaire correctly. Out of 325, the majority, 163(50.2%) were in the age bracket of 21-30 years of age and the least were those in the age groups of 31-40 years and 41-50 years, which was 1(0.3%) each respectively. A more significant proportion, 157(48.3%) of the respondents, were students of PAMO University of Medical Sciences (PUMS) and the most minor 82(25.2%) were students of Rivers State College of Health Science

and Management Technology (RSCOHSMAT). Most of the respondents, 136(41.8%), were in the 200 level of their study, followed by students in the 300 level 72(22.2%) and the least 18(5.5%) were in their 500 level of study. Christians were highest in number 304(93.5%). A large proportion, 302(92.9%) of the respondents were single. Out of 325 respondents, 246(75.7%) were studying medical and or medical-related courses, followed by sciences/engineering students, 47(8.6%) and the last 4(1.2%) were those studying pure arts courses (Table 1).

The respondents' level of awareness of PID

Most of the respondents, 186(57.2%) have heard of PID. Of these 186(57.2%), 82(44.09%) heard of PID via social media, followed by those that heard through seminar 37(19.89%) and the least 10(5.38%) were those who previously had PID infection. A greater number, 162(49.8%) of the respondents did not know the possible risk factors of PID and the least 80(24.6%) were not sure if they knew the possible risk factors of PID. Most of the

Table 2: Frequency and percentage distributions of the respondents' level of awareness of PID.

Variables	Frequency (f)	Percentage (%)
Have you heard of PID?		
Yes	186	57.2
No	139	42.8
Total	325	100.0
If yes to the question above, from which source?		
Radio	25	13.44
Social media	82	44.09
Seminar	37	19.89
I've been infected	10	5.38
Colleague	32	17.20
Total	186	100
Do you know the possible risk factors for PID?		
Yes	83	25.5
No	162	49.8
Not sure	80	24.6
Total	325	100.0
Have you or any of your close friends/relatives diagnosed of PID?		
Yes	50	15.40
No	205	63.10
Not sure	70	21.50
Total	325	100.0
If yes to the above question, what was the mode of diagnosis?		
Ultrasound	19	38.00
Laboratory test	26	52.00
Self-diagnosis by symptoms	5	10.00
Total	50	100.00
Do you know that PID is a sexually transmitted disease?		
Yes	124	38.2
No	205	61.5
Total	325	100.0
Have you ever heard of sexually transmitted disease?		
Yes	291	89.5
No	23	10.5
Total	325	100.0
How can you rate your awareness level of PID?		
Poor	161	49.5
Fair	134	41.2
Good	30	9.2
Total	325	100.0

respondents, 205(63.1%) said their close friends/relatives were not previously diagnosed with PID and 50(15.4%) of the respondents agreed that their close friends/relatives had been previously diagnosed with PID. Out of 50(15.40%) of the respondents who have had PID before, 26(52%) were diagnosed through a laboratory test and 5(10%) was self-diagnosed by symptoms. Out of 325 respondents, 205(61.5%) had no idea that PID is a sexually transmitted disease. The majority, 161(49.5%) of the respondents, perceived their awareness level of PID to be poor and the least 30(9.2%) had a good awareness level of PID (Table 2).

The respondent's level of knowledge of PID

Out of 325 respondents, 185(56.9%) do not know the mode of transmission of PID. Those who did not know

that unprotected sex could predispose them to PID, those that knew and those who were not sure were 130(40.0%), 154(47.4%) and 41(12.6%), respectively. The majority, 149(45.8%) of the respondents did not know how to protect themselves against being infected with PID and a greater 102(75.56%) said they would avoid unprotected sex. Most respondents did not know the symptoms associated with PID 216(66.5%). Of the 325 respondents, only 81(24.9%) knew that PID could be symptomless. A large number, 190(58.5%) of the respondents did not realize that PID could cause infertility, abortion and miscarriage. The greater proportion, 247(76%) of the respondents, did not know that intake of drugs/alcohol could predispose them to PID. Out of 325, 161(49.5%) of the respondents did not know that sexual abstinence is the most effective means of avoiding PID (Table 3).

Table 3: Frequency and percentage distributions of the respondents' level of knowledge of PID.

Variables	Frequency (f)	Percentage (%)
Do you know the mode of transmission of PID?		
Yes	102	31.4
No	185	56.9
Not sure	38	11.7
Total	325	100.0
Do you know that unprotected sex can dispose you to PID?		
Yes	154	47.4
No	130	40.0
Not sure	41	12.6
Total	325	100.0
Do you know how to protect yourself against being infected with PID?		
Yes	135	41.5
No	149	45.8
Not sure	41	12.8
Total	325	100.0
If yes to the question above, which of the following will you do to prevent infection?		
Avoid unprotected sex	102	75.56
Avoid multiple sexual partners	33	24.44
Total	135	100.00
Do you know the symptoms associated of PID?		
Yes	109	33.5
No	216	66.5
Total	325	100.0
Do you know symptoms of PID? (includes vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and dysmenorrheal)		
Yes	111	34.2
No	241	65.8
Total	325	100.0
Do you know that PID could be symptomless?		
Yes	81	24.9
No	244	75.1
Total	325	100.0
Do you know that PID could cause infertility, abortion and miscarriage?		
Yes	135	41.5
No	190	58.5
Total	325	100.0
Do you know that intake of some drug/alcohol can predispose you to PID?		
Yes	78	24.0
No	247	76.0
Total	325	100.0
Do you know that sexual abstinence is the most effective means of avoiding PID?		
Yes	164	50.5
No	161	49.5
Total	325	100.0

Relationship of students' awareness and knowledge of PID with their socio-demographic variables

There were statistically significant relationships between the student's age and the level of awareness at $p < 0.05$ with the exception of statements of sources of information on PID ($\chi^2 = 7.244$, $p = 0.84$), do you know the possible risk factors of PID ($\chi^2 = 10.902$, $p = 0.09$) and what was the mode of transmission ($\chi^2 = 3.205$, $p = 0.78$) (Table 4). Results of the knowledge level revealed that some

statements above were a statistically significant relationship with the student's age ($p < 0.05$), while other statements, such as do you know that unprotected sex can dispose you to PID showed a non-statistically significant relationship with the student's age ($\chi^2 = 6.709$, $p = 0.35$), do you know how to protect yourself against PID showed non-statistically significant relationship with the student's age ($\chi^2 = 6.172$, $p = 0.40$), do you know the symptoms of PID include (vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and

Table 4: Chi-square showing relationship between awareness and knowledge and age.

Variables	χ^2	df	p-value	Remarks
Awareness				
Have you heard of PID?	26.318	3	0.00	Sig
If yes to the question above, from which source? Radio, SM, Seminar, I've been infected, Colleague.	7.244	12	0.84	N/S
Do you know the possible risk factor of PID?	10.902	6	0.09	N/S
Have you or any of your close friends/relatives diagnosed of PID?	14.872	6	0.02	Sig
If yes to the question above, what was the mode of transmission?	3.205	6	0.78	N/S
Do you know that PID is a sexually transmitted disease?	9.707	3	0.02	Sig
Have you ever heard of sexually transmitted diseases?	10.461	3	0.02	Sig
How can you rate your knowledge of PID?	15.278	6	0.02	Sig
Knowledge				
Do you know the mode of transmission of PID?	16.342	6	0.01	Sig
Do you know that unprotected sex can dispose you to PID?	6.709	6	0.35	N/S
Do you know how to protect yourself against being infected with PID?	6.172	6	0.40	N/S
If yes to the question above, which of the following will you do to prevent yourself?	4.452	2	0.11	N/S
Do you know the symptoms associated with PID?	8.491	3	0.04	Sig
Do you know symptoms of PID? (Includes vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and dysmenorrhoeal)	4.767	3	0.19	N/S
Do you know PID could be symptomless?	8.588	3	0.03	Sig
Do you know PID could cause infertility and abortion?	6.603	3	0.09	N/S
Do you know that intake of some drugs/alcohol can predispose you to PID?	3.627	3	0.31	N/S
Do you know that sexual abstinence is the most effective means of avoiding PID?	8.307	3	0.04	Sig

Table 5: Chi-square showing relationship between awareness and knowledge and Institution.

Variables	χ^2	df	p-value	Remarks
Awareness				
Have you heard of PID?	8.968	2	0.01	Sig
If yes to the question above, from which source? Radio, SM, Seminar, I've been infected, Colleague.	17.753	8	0.02	Sig
Do you know the possible risk factor of PID?	21.058	4	0.00	Sig
Have you or any of your close friends/relatives diagnosed of PID?	1.597	4	0.02	Sig
If yes to the question above, what was the mode of transmission?	5.548	4	0.24	N/S
Do you know that PID is a sexually transmitted disease?	19.647	2	0.00	Sig
Have you ever heard of sexually transmitted disease?	8.285	2	0.02	Sig
How can you rate your knowledge of PID?	11.958	4	0.02	Sig

(Continued)

Variables	χ^2	df	p-value	Remarks
Knowledge				
Do you know the mode of transmission of PID?	43.308	4	0.00	Sig
Do you know that unprotected sex can dispose you to PID?	17.435	4	0.00	Sig
Do you know how to protect yourself against being infected with PID?	13.387	4	0.01	Sig
If yes to the question above, which of the following will you do to prevent yourself?	3.587	2	0.12	N/S
Do you know the symptoms associated with PID?	15.422	2	0.00	Sig
Do you know the symptoms of PID? (Includes vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and dysmenorrhoeal)	48.351	2	0.00	Sig
Do you know PID could be symptomless?	3.831	2	0.15	N/S
Do you know PID could cause infertility and abortion?	4.504	2	0.11	N/S
Do you know that intake of some drugs/alcohol can predispose you to PID?	0.676	2	0.71	N/S
Do you know that sexual abstinence is the most effective means of avoiding PID?	7.834	2	0.02	Sig

Table 6: Chi-square showing relationship between awareness and knowledge and level of study.

Variables	χ^2	df	p-value	Remarks
Awareness				
Have you heard of PID?	50.839	4	0.00	Sig
If yes to the question above, from which source? Radio, SM, Seminar, I've been infected, Colleague.	23.476	16	0.10	N/S
Do you know the possible risk factor of PID?	34.034	8	0.00	Sig
Have you or any of your close friends/relatives diagnosed of PID?	7.334	8	0.50	N/S
If yes to the question above, what was the mode of transmission?	5.153	8	0.74	N/S
Do you know that PID is a sexually transmitted disease?	23.625	4	0.00	Sig
Have you ever heard of sexually transmitted disease?	4.477	4	0.35	N/S
How can you rate your knowledge of PID?	33.359	8	0.00	Sig
Knowledge				
Do you know the mode of transmission of PID?	25.631	8	0.00	Sig
Do you know that unprotected sex can dispose you to PID?	14.974	8	0.06	N/S
Do you know how to protect yourself against being infected with PID?	18.325	8	0.02	Sig
If yes to the question above, which of the following will you do to prevent yourself?	12.148	4	0.00	Sig
Do you know the symptoms associated with PID?	16.014	4	0.00	Sig
Do you know symptoms of PID? (Includes vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and dysmenorrhoeal)	18.306	4	0.00	Sig
Do you know PID could be symptomless?	16.120	4	0.00	Sig
Do you know PID could cause infertility and abortion?	23.903	2	0.00	Sig
Do you know that intake of some drugs/alcohol can predispose you to PID?	20.981	4	0.71	N/S
Do you know that sexual abstinence is the most effective means of avoiding PID?	19.811	2	0.02	Sig

Table 7: Chi-square showing relationship between awareness and knowledge and course of study.

Variables	χ^2	df	p-value	Remarks
Awareness				
Have you heard of PID?	3.403	3	0.33	N/S
If yes to the question above, from which source? Radio, SM, Seminar, I've been infected, Colleague.	26.471	2	0.00	Sig
Do you know the possible risk factor of PID?	6.875	6	0.33	N/S
Have you or any of your close friends/relatives diagnosed of PID?	5.404	6	0.49	N/S
If yes to the question above, what was the mode of transmission?	3.150	4	0.53	N/S
Do you know that PID is a sexually transmitted disease?	0.424	3	0.94	N/S
Have you ever heard of sexually transmitted disease?	8.915	3	0.03	Sig
How can you rate your knowledge of PID?	10.949	6	0.09	N/S
Knowledge				
Do you know the mode of transmission of PID?	18.025	6	0.06	N/S
Do you know that unprotected sex can dispose you to PID?	3.801	6	0.70	N/S
Do you know how to protect yourself against being infected with PID?	4.920	6	0.55	N/S
If yes to the question above, which of the following will you do to prevent yourself?	6.257	3	0.10	N/S
Do you know the symptoms associated with PID?	0.591	3	0.99	N/S
Do you know symptoms of PID? (Includes vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and dysmenorrheal)	12.815	3	0.00	Sig
Do you know PID could be symptomless?	2.237	3	0.56	N/S
Do you know PID could cause infertility and abortion?	0.197	3	0.99	N/S
Do you know that intake of some drugs/alcohol can predispose you to PID?	3.099	3	0.38	N/S
Do you know that sexual abstinence is the most effective means of avoiding PID?	4.050	3	0.26	N/S

dysmenorrheal showed non-statistically significant relationship with the student's age ($\chi^2=4.767$, $p=0.19$) (Table 4).

Almost all the responses on the awareness level show statistically significant relationships with the student's institution with p -value <0.05 with the exception of the statement, what is the mode of transmission of PID ($\chi^2=5.543$, $p=0.24$) (Table 5). A few of the statements on the student's knowledge of PID show a non-statistically significant relationship with their institution at p -value >0.05 (Table 5).

Table 6 shows the relationship between the participant's awareness and knowledge level and their study level. On an awareness level, the responses to the following statements; have you heard of PID showed a statistical significant relationship with student's level of study ($\chi^2=50.839$, $p=0.00$), do you know the possible risk factors of PID showed a statistical significant relationship with student's level of study ($\chi^2=34.034$, $p=0.00$), do

you know that PID is a sexually transmitted disease showed a statistical significant relationship with student's level of study ($\chi^2=23.635$, $p=0.00$) and how can you rate your knowledge of PID showed a statistical significant relationship with student's level of study ($\chi^2=33.359$, $p=0.00$) while other statements on the awareness level show a non-statistically substantial relationship with the statements level of study ($p>0.00$).

Concerning the student's level of knowledge, the following statements; do you know that unprotected sex can dispose you to PID? ($\chi^2=14.924$, $p=0.06$) and do you know that intake of some drugs/alcohol can predispose you to PID ($\chi^2=20.981$, $p=0.71$) did not show statistically significant relationships with the student's level of study, while other statements on the level of knowledge show statistically significant relationships with the student's level of study at a p -value less than 0.05 (Table 6).

The student's level of awareness and knowledge of PID, and their course of study relationships were illustrated in Table 7. Awareness level statements such as a source of information on PID ($\chi^2=26.471$, $p=0.00$) and have you heard of sexually transmitted disease ($\chi^2=8.915$, $p=0.03$), were statistically related to the student's course of study, while other statements show non-statistically significant relationships with the student's course of study. On the student's level of knowledge, almost all the statements showed non-statistically significant relationships with the student's course of study with the exception of do you know PID could be symptomless, which shows a statistically significant association with the student's course of study ($\chi^2=12.815$, $p=0.00$).

DISCUSSION

We found that most respondents were in the age bracket of 21-30 years of age and the least were those in the age groups of 31-40 years and 41-50 years. This is inconsistent with the finding of a related study conducted by Amu and Adegun (2015) in Southwest Nigeria on the awareness and knowledge of sexually transmitted diseases among secondary school adolescents, which reported the age group 15-19 years to highest. The discrepancy in our findings could be ascribed to the different sample sizes studied as well as the different populations studied. In this present study, undergraduate's female students in tertiary institutions were sampled, while in Amu and Adegun's (2015) study, secondary school students were studied.

A greater proportion of the respondents were PAMO University of Medical Sciences (PUMS) students and the least from Rivers State College of Health Science and Management Technology (RSCOHSMAT). This may be so because the majority of the authors are staff of PAMO University of Medical Sciences, which gives them easy access to the students. Most of the respondents were in 200 levels of their study, followed by students in 300 levels and the least were in their 500 levels of study. Large proportions of the respondents were single.

We also found that most of the respondents were studying medical and/or medical-related courses, followed by sciences/engineering students and the last were those studying pure arts. This was due to the fact that two of the institutions were basically offering medical courses, with the third institution offering few medical-related educational courses. This is not in keeping with the finding of a related study conducted among university students in Malaysia, which evaluated the knowledge level, attitudes, risky behaviors and preventive practices on sexually transmitted diseases by Folasayo *et al.* (2017). Their findings suggest that the majority of the respondents in their study were non-health sciences students. This difference may be so due to the nature of the different studies as well as the sample sizes included in the respective studies. In our study, only PID was assessed, while in Folasayo *et al.* (2017), sexually transmitted diseases were evaluated.

Most of the respondents have heard of PID. Of those that have heard of PID, the majority heard via social media, followed by those that heard through seminars and the least were those who previously had the disease. These findings shows that social media has contributed significantly to information dissemination. However, some of the students also got to know about PID through seminars.

With regards to the respondent's awareness and knowledge of PID, there were poor awareness and knowledge of PID among the respondents as a greater percentage of the respondents had no idea that PID is a sexually transmitted disease, the majority do not know of the mode of transmission. The majority of the respondents did not know how they could protect themselves against PID, whereas a greater said they would avoid unprotected sex. Most of the respondents did not know the symptoms associated with PID. Of the 325 respondents, only a few knew that PID could be symptomless. A large number of the respondents did not know that PID could cause infertility, abortion and miscarriage.

Risk factors of PID were evaluated and the results revealed that there was poor awareness and knowledge of the risk factors of PID among the respondents as the majority of the respondents did not know that intake of drugs/alcohol could predispose them to PID and 49.5% of the respondents did not know that sexual abstinence is the most effective means of avoiding PID. Also, more than half of the respondents either did not know or were not sure know that unprotected sex could predispose them to PID.

Most of the respondents said their close friends/relatives were not previously diagnosed with PID, while half of the respondents agreed that their close friends/relatives had been previously diagnosed with PID. Out of those that were previously infected with PID, a good number were diagnosed through laboratory tests, followed by those that were diagnosed on ultrasound and those that had self-diagnosis were the least. However, this result revealed that only few of the respondents were aware of the mode of diagnosis of PID.

There were statistically significant relationships between the student's age and level of awareness statements at $p<0.05$ with the exception of statements of sources of information on PID do you know the possible risk factors of PID and the mode of transmission. These findings imply the age of the respondents has so much influence on their awareness of PID. However, their understanding of how to obtain information on PID, risk factors and the mode of transmission of the PID has nothing to do with their age. This could be attributed to the fact that access to social media and other sources of information may not depend on the individual's age.

Results of the knowledge level revealed that some responses showed statistically significant relationship with the student's age ($p<0.05$) the exception of some responses such as do you know that unprotected sex can dispose you to PID? Do you know how to protect yourself

against PID? Do you know the symptoms of PID includes vaginal discharge, smelling urine, pelvic heaviness, chronic pelvic pain and dysmenorrhea shows no statistically significance with age. These findings revealed that the age of the individual has a significant effect on the extent of knowledge an individual may have about PID.

Almost all the responses on the awareness level show statistically significant relationships with the student's institution with a p -value <0.05 with the exception of the statement, what is the mode of transmission of PID. Only a few of the statements on the student's knowledge of PID shows a non-statistically significant relationship with their institution at p -value >0.05 . These findings imply that awareness and knowledge of PID were strongly influenced by the type of the respondents' institutions, which also, in turned influenced by the courses offered by the institutions. This is so because non-medical school students may not have any awareness or knowledge of PID.

The relationship between the level of the participant's awareness and knowledge, and their level of study was evaluated on an awareness level, the following statements (questions); Have you heard of PID? Do you know the possible risk factors of PID? Do you know that PID is a sexually transmitted disease and how can you rate your knowledge of PID shows statistically significant relationships with the student's level of study. In contrast, other statements on the awareness level show non-statistically significant relationships with the statements level of study ($p>0.00$). Concerning the students' level of knowledge, the following statements; do you know that unprotected sex can dispose you to PID and do you know that intake of some drugs/alcohol can predispose you to PID did not show statistically significant relationships with the student's level of study while other statements on level of knowledge show a statistically significant relationship with the student's level of study at p -value less than 0.05.

The student's level of awareness and knowledge of PID and their course of study relationships were evaluated in this study. Awareness level statements such as sources of information on PID and have you heard of sexually transmitted disease were statistically significantly related to the student's course of study while other statements show a non-statistically significant relationship with the student's course of study. On the student's level of knowledge, almost all the statements showed non-statistically significant relationships with the student's course of study with the exception of do you know PID could be symptomless that shows a statistically significant association with the student's course of study.

CONCLUSION

Though the findings of the study reveal that majority of the respondents have heard of PID via social media and seminars and have even seen those who had the disease, they still claim that their awareness level was poor since they do not know the mode of transmission

and ill effects of PID; and so cannot be protected against the disease. Therefore, a sensitization campaign in the form of health education on risk factors, symptoms and mode of spread of the disease has to be carried out in the institutions to save the students who are at high risk as well as the larger population.

AUTHORS' CONTRIBUTIONS

All authors have read and approved the manuscript. Each author participated sufficiently in this submission and the roles of the authors were: MPO, EOO and EAO were the leading researchers, drafted the manuscript, responsible for data capturing, presentation of results, AHH, CUN, RAO and GIA carried out the interpretation of results and also gave recommendations on the review of literature and provided critical comments on the research work.

CONFLICT OF INTEREST

There is none declared among the authors.

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