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Correlation Analysis of Bacterial Vaginosis and Hygiene Practices Among Pregnant Women Attending Ante-Natal Clinic at General Hospital Ijebu Ode Ogun Southwestern Nigeria

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Abstract
The study was carried out to assess the incidences of Bacterial Vaginosis among the pregnant women attending ante-natal clinics, State Hospital Ijebu-Ode Southwestern Nigeria. The objectives of the study were to determine the incidence of bacterial vaginosis among the pregnant women, the distribution of infection during the dry and wet seasons and determine the relationship between the infection incidence and hygiene practices in the study area. a total number of fifty (50) pregnant women attending ante-natal clinics complaining of vagina itching had two set of swab samples collected during the dry and wet seasons of 2014. After the collection of these swab samples, structured questionnaires were administered to the pregnant women each with their responses matched with their swab results that were examined microscopically using the wet examination method, culturing the samples and some biochemical tests for the detection and confirmation of bacteria vaginosis infections. The results showed that twenty four (24) and thirty five (35) swabs tested positive during dry and wet season, with three common abnormal bacteria floral detected, (11) (46%) positive with *Staphylococcus aureus*, 3(13%) *Proteus spp* and 10(42%) *Candida albican* while (13) (37%) positive with *Staphylococcus aureus*, (5)(14%) *Proteus spp*, and (17) (49%) infected with *Candida albican*, during dry and wet season respectively. Furthermore, poor hygiene practices that might have caused the infections was sharing of sanitary facilities without considering cleanliness, wearing of wet pants/underwear and not changing of the dirty pants/underwear, and unfortunately using of local herbs/concoctions to wash and cleanse their practices as traditional beliefs to safeguard and safe delivery of unborn babies. The study concluded that there is need for health and hygiene education during ante natal programme for the pregnant women, designed to teach them about the cause, prevention and management of the vaginal infections and discourage and abuse their minds on the effects of harmful medical practices during pregnancy Based on the results of the study a number of possible policy recommendations that would enhance the preventives and control measure of the infections involving all the stakeholders like community leaders, traditionalists, herbalists and the husbands should be put in place.

Keywords: Bacterial Vaginosis, Infection, Hygiene, Ogun, Pregnant Women, Traditional

1. Introduction
Bacterial vaginosis (BV) can be thought of as a disturbance in this vaginal ecosystem in which the lactobacilli are replaced by an overgrowth of vaginal commensal organisms. It may be transient or become persistent (Hay, 2002) [10]. The infection is recognized as the most common cause of abnormal vaginal discharge in women of childbearing age (Hay, 2002) [10] and (Morris *et al*., 2001). Furthermore, Bacterial vaginosis is known to be one of the most common causes of reproductive tract infection (RTI) and its prevalence is influenced by many factors (Bahram, *et.al*., 2009) [1].

The condition characterized by a global disturbance of the vaginal microflora with an overgrowth of Gardnerella *vaginalis* and other anaerobic bacteria species (Klebanoff *et al*., 2010) [13]. Observational studies have shown an association between BV and douching, but whether douching contributes to BV or is performed in response to symptoms remains unclear. Then, Massinde *et al*., (2012) [14], citing other different authors, reported that Bacterial vaginosis (BV) is among the most common reproductive tract condition worldwide characterised by low levels of lactobacilli and an increased frequency of facultative anaerobic bacteria. Its prevalence among African population has been estimated to range from 20% to

50%, and even higher levels have been documented among female sex workers (Fleury, 1981; Cristiano *et al*., 1989; Ramjee, *et al.,* 1998; McGregory, 2000; Holzman *et al*., 2001; Fonck *et al*., 2001; Riedner *et al*., 2003; Myer *et al*., 2005). Although the aetiology of BV is still unknown, the condition is associated with changes in vaginal ecology, resulting into overgrowth of certain bacteria such as Gardnerella vaginalis, Mycoplasma homonis, Ureaplasma urealyticum, Mobiluncus spp., Provotella spp., Bacteroides spp. and the depletion of hydrogen producing lactobacilli (Hill, 1993) [11]. Other factors known to increase the risk of BV include sexual activities, vaginal hygiene practices, HIV infection, marital status, black race and sexually transmitted infections (Goldenbert, *et al*., 1996; Ness *et al*., 2002; Bukusi, *et al*., 2006; Hassan *et al*., 2007; Fethers *et al*., 2008, 2012; Chepes *et al*., 2008; Haggerty *et al*., 2009) [2, 7, 3].

However, the study was carried out among the pregnant women attending ante-natal clinic of General Hospital Ijebu Ode Southwestern Nigeria to determine the occurrence of bacterial vaginosis and relationship between the genital hygienic practices and socio-demographic characteristics of the patients. The study was designed and carried out in two stages- Wet Season (May-August 2014 and during dry season (November 2014 -February, 2015). This was an effort to determine the influence environmental factors (weather and climatic conditions) coupled with availability of water to carry out personal hygiene among the pregnant women like bathing and washing.

Objective of the study

The purpose of the study is to determine the occurrence of bacterial vaginosis among the pregnant women attending ante-natal clinics of General Hospital Ijebu Ode Southwestern Nigeria and the effect of socio-environmental factors on the occurrence of the infection.

The Specific Objectives of the study

In the course of the study the following specific objectives were addressed:

- To determine the incidence of bacterial vaginosis among the pregnant women
- To evaluate the distribution of infection during the dry and wet seasons.
- To determine the relationship between the infection incidences and hygiene practices.

Materials and Method

In the course of the study, a total number of fifty (50) pregnant women attending ante-natal clinics complaining of vagina itching had two set of swab collected from them-High Vaginal Swab and Endocervical swab samples collected during the dry and wet seasons.

After the collection of these swab samples, structured questionnaires were administered to the pregnant women each and after completion the questionnaire were retrieved for analysis.

Laboratory Procedures for the detection of bacterial vaginosis and confirmation of the microorganism constituents.

According to Hillier (1993) [12], Bacterial vaginosis is characterized microbiologically by replacement of the Lactobacillus-predominant vaginal flora by Gardnerella vaginalis, Bacteroides species, Mobiluncus species, and genital mycoplasmas. A standardized, laboratory-based diagnostic test for bacterial vaginosis is desirable in those instances in which a microscope is unavailable in the clinic or when the evaluator of the wet mount examination is inexperienced at recognizing clue cells. Vaginal cultures have excellent sensitivity for the diagnosis of bacterial vaginosis. Vaginal Gram stains are more useful than culture for laboratory confirmation of bacterial vaginosis (Hillier, 1993) [12].

However, the detection of bacterial vaginosis and confirmation of the microorganisms constituents were done using the students of Department of Medical Laboratory Technique and Water Resources Management and Sanitation, Ogun State College of Health Technology, Ilese-Ijebu Nigeria on Practical Experiences for the collection of the Swab samples and carrying on four different tests to confirm the absence or presence of the bacterial vaginosis with the supervision of the researchers**.**

The following specimens are collected from the interior vaginal wall

(a) vaginal swab for pH
(b) vaginal smear for clue cells
(c) vaginal swab for KOH whiff test:
(d) vaginal swab for culture of microorganisms

Determination by Wet Mount Test

(a) Procedure of Wet mount.

1. A sample of vaginal discharge is mixed with a salt solution on a microscope slide.
2. The slide is checked for bacteria, white blood cells, and unusual cells called clue cells.
3. If clue cells are present, it means bacterial vaginosis may be present.

Wet preparation techniques

Step 1

- Mix sample in vial and place one drop of the solution onto a slide
- Examine microscopically using high power (40x) objectives for the presence of trichomonas and clue cells

Step II

Wet preparation with KOH

- Mix sample in vial and place two drops of the solution into a small test tube
- Add two drops of 20% KOH with DMSO to the tube
- Mix and allow to sit for about 5 minutes until the materials has cleared
- Place one drop on the slide and examine microscopically for the presence of budding yeast cells and /or pseudohyphae forms.

Determination of pH

Procedure of Vaginal pH

1. Use pH strip to determine the pH of the swab
2. If the pH is greater than pH then there is presence of Bacterial vaginosis because of the normal vaginal pH is 3.8 to 4.5.
3. Bacterial vaginosis often causes the vaginal pH to be greater than 4.5.

Culturing Method

Preparation of Mac Conkey Agar

Peptone and agar form the base to which the following substances are added:

- Lactose (a fermentable carbohydrate)
- Bile salt (sodium taurocholate)- inhibits most gram positive organisms

- 1% aqueous neutral red- for the acidity of the medium
- Sodium chloride- optional
- Water – solvent for all the ingredients

Preparation
- Mac Conkey agar base (oxoid) 23.5g
- Distilled water
- Mix together in a universal bottle
- Adjust the pH to 7.4
- Sterilize at 121^0C for 15 minutes
- Mix well
- Pour plate as soon as it cool enough to be handled
- Label and store

Method of Inoculation
- With a sterile wire loop or using the swab of a specimen, apply the inoculation to a small area of the plate
- Sterile the loop in the Bunsen flame, when cool
- Streak out the inoculums over area
- Then incubate medium at the appropriate temperature

Preparation of chocolate agar
Chocolate agar is been prepared from blood agar by re-heating the blood agar medium for some period of time till it turn chocolate colour

Gram Staining Techniques
- Preparation and heat fix smears
- Stain the slides as follow
- Flood the smear with crystal violet for 1 minute
- Pour off excess dye and wash gently in tap water and drain the slide against a paper towel
- Expose the smears to gram's iodine for one minute
- Wash with tap water and drain carefully (do not blot)
- Wash with 95% alcohol for 30 seconds (decolorizer)
- Wash with tap water at the end of 30 seconds to stop the decolourization
- Counter stain with 0.25% safranin for 30 seconds
- Wash, drain, blot and examine under oil immersion lenses

Expected Result: Positive Techniques

Biochemical Test
Coagulase test
Principle: The bound coagulase is also known as clumping factor, it cross links the α and β chain of fibrinogen in plasma to form fibrin clot that deposits on the cell wall. As a result, individual locus stick to each other and dumping is observed.

Procedure
- Dense suspensions of staphylococci from culture are made on two ends of clean glass slide
- One labelled as test and the other as control
- The test suspension is treated with a drop of citared plasma and mixed well
- Aggutination of cocci within 5-10 seconds is taken as positive.

Catalase Test
Procedure
- Place 0.2ml of hydrogen peroxide solution in a test tube
- Pick a colony to be with straight loop
- Rub a colony onto the inside wall of the bottle above the surface of the hydrogen peroxide solution
- Cap the tube and tilt it to allow the hydrogen peroxide solution to cover the colony
- Look for vigorous bubbling occurring within 10 seconds

This indicates the presence of catalase

Oxidase Test
Principle: The oxidase is used to identify bacteria that produce cytochrome oxidase, enzymes of the bacterial electron transport chain.

Materials Needed
Moisten filter paper with the substrate (1% tetramethyl-p-phenylediamine dihydrochloride) or commercially prepared paper disk, wooden wire or platinum wire

Procedure
- Take a filter paper soaked with the substrate tetra methyl-p-phenylenediaine dihydrochloride.
- Moisten the paper with a sterile distilled water
- Pick the colony to be tested with wooden or platinum loopand smear in the filter paper
- Observe inoculated area of paper for a colour change to deep blue or purple within 10-30 seconds

Expected Result
Bacteria oxidase positive include:
Neisseria spp and Pseudomonas spp
Enterobacteriaceae are oxidase negative

Sugar Fermentation
Principle-The sugar fermentation is used to identify the utilization of sugars by the bacteria in the production of acid or acid and gas based on the type of bacteria species
Materials –Peptone water and sugars(s)
Procedure-The peptone water (sugars) were inoculated with the colonies from the plate
Incubated at 37 ^{o}C overnight
Observed for colony change and gas production

Expected Result
Colour changed base on the utilization of sugar and indicator used

Procedures for Questionnaires Administration
A structured questionnaire designed to elicit information from the pregnant women consist of two sections A and B. The section A consists of demographic characteristics of the pregnant women while section B consists of their personal hygiene practices and predisposing risk factors. The literate ones among the women were given the copies of the questionnaires to fill and retrieve on the spot while the illiterate ones were asked the questions and their responses were recorded.

Procedures for Data Analysis
Descriptive statistics of frequency count and percentage were used to analyse the demographic aspect of the data collected while inferential statistics of correlation analysis test, with the simple Microsoft excel calculation of coefficient of determination $R^2$was used to establish the degree of relationship between the hygiene practices and the incidences of bacteria vaginosis during the dry and wet seasons.

Results and Discussion

Demographics Characteristics of the Respondents

The following tables 1, 2, 3, 4 and 5 showed the results on the demographics characteristics of the respondents that can influence the attitude of the respondents toward the hygiene practices which are the focus in the study as determinants for the bacterial infections among the pregnant women.

Age Distribution of the Respondents

Table 1: showing the age distribution of the respondents during dry and wet seasons.

Age (years)	Pregnant women (Dry season)		Pregnant women (Wet season)	
	No of Respondents	%	No of Respondents	%
20-25	12	24	13	26
26-30	20	40	21	42
31-35	8	16	6	12
36-40	7	14	5	10
40 above	3	6	5	10
Total	50	100	50	100

The table above shows the result of the age distribution of the patients collected during dry season. Twelve 12 of the surveyed pregnant women (24%) were within the age range 20-25years, 20(40%) were within the age range of 26-30years, 8(16%) were within the age range of 31-35 years, 7(14%) were within the age range 36-40years, 3 (6%) were within the age range 40years above. However, there is slight different in the age distribution during wet season. Thirteen 13 of the surveyed pregnant women (26%) were within the age range 20-25years, 21(42%) were within the age range of 26-30years, 6(12%) were within the age range of 31-35 years, 5(10%) each were within the age range 36-40years and the age range 40years above.

Occupational Distribution of the Respondents

Table 2: showing the occupation distributions of the respondents' dry and wet seasons.

Occupation	Pregnant women (Dry season)		Pregnant women (Wet season)	
	No of Respondents	%	No of Respondents	%
Students	8	16	13	26
Civil servants	10	20	5	10
Trading	22	44	16	32
Housewife	5	10	15	30
Others	5	10	1	2
Total	50	100	50	100

The table above shows the occupation of the patients, for those part of the survey during the dry season the results showed that, 8 (16%) are studying in various schools, 10 (20%) are civil servants, 22 (44%) engage in trading activities, and the 5(10%) responded to be full house wives without no jobs depending on their husbands and others were 5 (10%) with various kind of menial jobs. Then, for respondents during the wet season, the occupation distribution showed that 3 (26%) are studying in various schools, 5 (10%) are civil servants, 16 (32%) engage in trading activities, and the 15(30%) responded to be full house wives without no jobs depending on their husbands and one respondent engaged in various kind of menial jobs.

Educational Status of Respondents

Table 3: showing the Educational Status of the respondents' dry and wet seasons.

Educational Status	Pregnant women (Dry season)		Pregnant women (Wet season)	
	No of Respondents	%	No of Respondents	%
Primary	5	10	3	6
Secondary	23	46	20	40
Diploma	10	20	10	20
Graduate	8	16	5	10
No formal Education	4	8	12	24
Total	50	100	50	100

The table 3 above shows the educational background/qualifications of the pregnant women. From those surveyed during season, five (5) (10%) had primary education, 23(46%) had secondary certificate, 10 (20%) had Diploma certificate, 8(16%) are graduate and 4(8%) had no formal education. However, the educational background differed, three (3) (6%) had primary education, 20(40%) obtained secondary certificate, 10 (20%) had Diploma certificate, 5 (10%) are graduate and the rest 4(8%) had no formal education.

Religious Affiliations of the Respondents

Table 4: showing the Religious Affiliations of the respondents' dry and wet seasons.

Religious Affiliation	Pregnant women (Dry season)		Pregnant women (Wet season)	
	No of Respondents	%	No of Respondents	%
Islam	20	40	25	50
Christianity	25	50	20	40
Traditional	3	6	5	10
None	2	4	0	0
Total	50	100	50	100

The table 4 above shows the religious affiliations of the pregnant women. The results showed that during dry season, 20(40%) are Muslims, 25 (50%) are Christians, 3(6%) were traditional worshippers and 2(4%) practiced none of the religions. But, results obtained during dry season indicated that twenty (25) 50% are of Islamic faith, twenty (20) 40% are Christians and the rest were traditionalists.

Educational Status of the Respondents

Table 5: showing the Educational Status of the respondents' dry and wet seasons.

Educational Status	Pregnant women (Dry season)		Pregnant women (Wet season)	
	No of Respondents	%	No of Respondents	%
Yoruba	45	90	30	60
Ibo	2	4	10	20
Hausa	2	4	5	10
Others	1	2	5	10
Total	50	100	50	100

The table 5 above shows the tribe of the pregnant women that took part in the survey, during dry season, 45 (90%) were Yorubas, 2 (4%) were Ibos, 5(%) were Hausa and 1 (10%)

were from other tribes in Nigeria. On the other hands, the survey during the wet season showed that 30 (60%) were Yorubas, 10 (20%) were Ibos, 5(%) were Hausa and 5 (10%) were from other tribes in Nigeria.

Incidence of Bacterial Vaginosis among the pregnant women

Results of Positive and Negative of the Swab Samples during dry and wet season

Table 6: showing the positive and negative results of the swab samples

Results	Pregnant women (Dry season)	Pregnant women (Wet season)
	No of Respondents	No of Respondents
Positive Samples (+)	24	35
Negative Samples (-)	26	15
Total	50	50

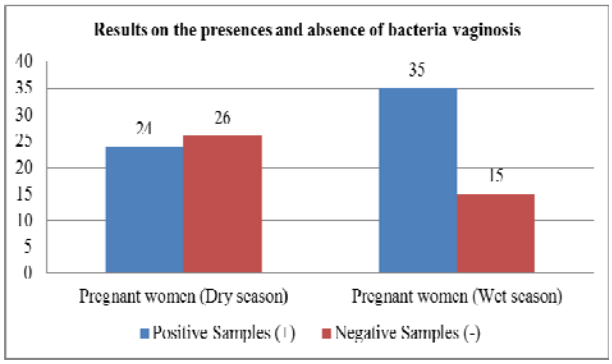

Fig 1: Showing the presence of and absence of the bacteria vaginosis in the swab samples

The table 6 and figure 1 above showed the number of swab samples tested positive and negative for bacterial vaginosis. The numbers of positive tested swab were twenty four (24) while 26 were negatively tested for samples collected during dry season. On the hand, thirty five (35) collected swabs were tested positive while the rest fifteen (15) were negative that means there is no presence of bacterial vaginosis. This is an indication that the incidence of the infection occurred more during wet season than dry season.

Results of Microorganisms detected in the Swabs Samples during dry and wet season

Table 7: Showing the microorganisms detected from the pregnant women during dry season

Age (years)	Positive samples		*Staphylococcus aureus*		*Proteus Spp*		*Candida albican*	
	N	%	N	%	N	%	N	%
20-25	3	12.5	3	27.3	-	-	4	40
26-30	12	50.0	4	36.4	2	67	3	30
31-35	3	12.5	2	18.2	-	-	1	10
36-40	2	8.3	1	9.1	-	-	2	20
41 above	4	16.7	1	9.1	1	33	-	-
Total	24	100	11	100	3	100	10	100

The table above 7 shows the results of microorganisms distributions detected from the twenty four (24) positive pregnant women during the dry season, eleven (11) (46%) of the total positive women were infected with *Staphylococcus aureus*, 3(13%) of the positive patients had *Proteus Spp* and 10(42%) of the positive patients had *Candida albican*. However, the incidence of the bacterial vaginosis is common among the age groups between 26-30 years of age with twelve (12) pregnant women infected, those at age of 41 and above were (2), then three (3) from age groups of 20-25 and 31.35 respectively. These numbers of incidences translated to the number of microorganisms detected as these figures can be seen in the table 7 above.

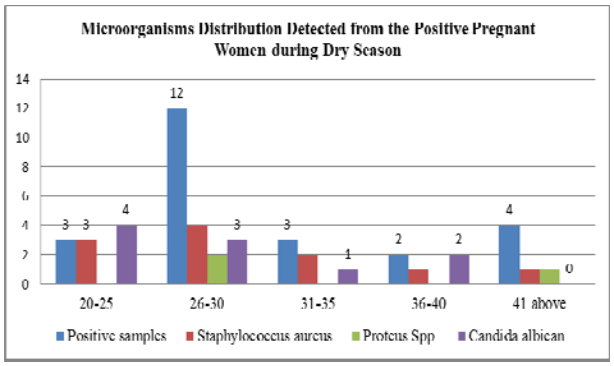

Fig 2: Showing the microorganisms detected in the positive tested pregnant women during dry season

However, the table 8 and figure 3 below showed the results obtained during the wet season. Out of thirty five (35) positive tested pregnant women, thirteen (13) (37%), five (5).(14%), seventeen (17) (49 %) of the women were infected with *Staphylococcus aureus*, *Proteus Spp Candida albican*, respectively. But, the incidence of the bacterial vaginosis are common among the age groups between 26-30 years and 31-35 years of ages with ten (10) pregnant women were infected, while those at between age of 36-40 years were nine (9), and 20-25 age groups were four (4) and those of women of 41years and above are two (2). Similarly, these numbers of incidences translated to the number of microorganisms detected and those figures can be seen in the table 8 and figure 3 below.

Table 8: Showing the microorganisms detected from the pregnant women during wet season

Age (years)	Positive samples		*Staphylococcus aureus*		*Proteus Spp*		*Candida albican*	
	N	%	N	%	N	%	N	%
20-25	4	11.43	3	23.08	-	-	4	23.53
26-30	10	28.57	4	30.77	3	60	6	35.29
31-35	10	28.57	3	23.08	2	40	5	29.41
36-40	9	25.71	2	15.38	-	-	2	11.76
41 above	2	5.71	1	7.69	-	-	-	-
Total	35	100	13	100	5	100	17	100

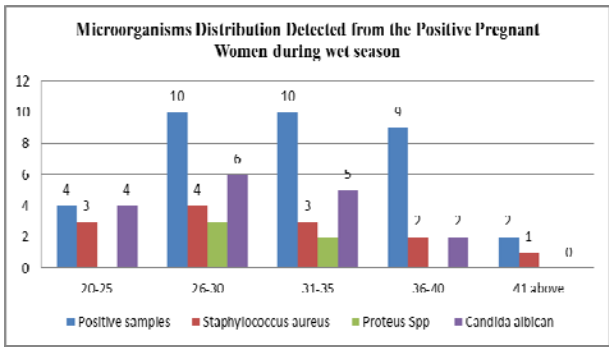

Fig 3: Showing the microorganisms detected in the positive tested pregnant women during wet season

Results of Hygiene Practices among the Pregnant Women during the Dry and Wet Seasons

Responses on Sharing of Facilities with others

Table 9: Showing the responses on sharing of facilities

	Pregnant women (Dry season)		Pregnant women (Wet season)	
Do you share sanitary facilities with others?	**No of Respondents**	**%**	**No of Respondents**	**%**
Yes	47	94	40	80
No	3	6	10	20
Total	50	100	50	100

The table 9 above, showing the responses of the pregnant women either they share sanitary facilities (toilets, bathroom) within their households or in public places. The 47 (94%) of respondents surveyed during the dry season do shared the sanitary facilities and the majority do not care about the state of cleanliness of these facilities. In similar trend, forty (40) of the respondent surveyed during the wet season also shared sanitary facilities and do not mindful of the cleanliness of these facilities.

Responses on regular changes of used/dirty pant/underwear

Table 10: Showing the responses on the regular change of dirty pant/underwear

	Pregnant women (Dry season)		Pregnant women (Wet season)	
How often do you change your pant	**No of Respondents**	**%**	**No of Respondents**	**%**
a. Everyday	25	50	13	26
b. Not Everyday	15	30	25	50
c. Neither of the two above options	10	20	12	24
Total	50	100	50	100

The table 10 above showed the responses of the pregnant women on whether they change their pants/underwear daily or not. The responses of those that are surveyed during the dry season were different from those of wet season. Twenty five (25) reported to change their pants every day before they go to bed and fifteen (15) admitted changing theirs the following day, with the rest ten (10) neither opted for first the two options stated in the table 10 above. However, with the further probe by the researchers, the rest respondents do not usually wear pants/underwear during the pregnancy. On the other hands, the results of those surveyed during wet season indicated that thirteen (13) reported to change their pants every day before they go to bed and twenty five (25) admitted changing theirs the following day, with the rest twelve (12) neither opted for first the two options stated in the table 10 above.

Responses on wearing of wet pant/underwear

Table 11: Showing the responses wearing of wet pant/underwear

	Pregnant women (Dry season)		Pregnant women (Wet season)	
Do you wear wet pant/ underwear?	**No of Respondents**	**%**	**No of Respondents**	**%**
Yes	2	4	21	42
No	48	96	29	58
Total	50	100	50	100

The responses on the putting on wet pants/underwear as displayed on the table 11 showed that the majority of those surveyed (48) during dry season do not wear wet pant while on the other hands, those surveyed during wet season, thirty eight (38) wear wet pants/underwear. This is possible because of constant rain and mo sunshine to dry the washed pants/underwear coupled with some of the respondents not having enough pants/underwear to change with.

Responses on the regular use of soap to wash vagina

Table 12: Showing the responses on the use of soap to wash vagina

	Pregnant women (Dry season)		Pregnant women (Wet season)	
Do you use soap to wash your vagina?	**No of Respondents**	**%**	**No of Respondents**	**%**
Yes	48	96	47	94
No	2	4	3	6
Total	50	100	50	100

The majority of respondents surveyed at both seasons do make use of soap to wash their vagina. This act can affect the flora of the vagina and can create a potential opportunities for harmful microorganisms to cause infections among the pregnant women. Though use of soap for bathing is of high hygiene practices but the excessive use of soap might causedisruption in the balance of vaginal flora. According to Disabled World (2015), washing of the vagina too often increases its pH, which disrupts the vaginal flora and can cause vaginal infections and particularly unpleasant odours (Disabled World, 2015). If the vaginal flora is disrupted, pathogenic bacteria proliferate, resulting in bacterial vaginosis. This type of proliferation tends to increase the number of bacteria normally present in the vagina causing unpleasant fishy vaginal odour (Disabled World, 2015). Furthermore, according to the National Health Service UK, women use avoid perfumed soaps, gels and antiseptics as these can affect the healthy balance of bacteria and pH levels in the vagina, and cause irritation. Unfortunately in some part of the area where the study been carried some cultures allow the pregnant women to apply some herbal concoction in their private parts so that to ensure their safe delivery.

Poor Hygiene Practices and Incidences of the Bacteria Vaginosis

This section and table 13 contained the potential poor hygiene practices that can result to disturbance of vaginal flora that can lead bacteria vaginosis and infections among pregnant women- (1) the practices are the sharing of sanitary facilities by the pregnant women without care for the cleanliness state of the facilities, (2) not changing the pant when daily, when they have discharge, (3) wearing of wet pant due to whatever reason like no sunshine to dry the pants after washing them, or to make them feel comfortable and (4) use of herbal concoction to wash their private part for easy baby delivery or as part culture depending which family or tribe the women marry from. Then, the number of Yes responses on these practices were matched with those that they are tested positive with the bacteria vaginosis.

Table 13: Showing the Poor Hygiene Practices and Incidences of the Bacteria Vaginosis

	Pregnant women (Dry season)	Pregnant women (Wet season)
	Positive Samples (24)	Positive Samples (35)
Sharing of sanitary facilities	21	32
Not changing of pant/ under wear for a day	15	25
Wearing wet pant/ underwear	2	21
Use Herbal Concoction for Vagina Cleanse	20	25

The table 13 above and figure 3 below displayed the number of the pregnant women who engaged in poor hygiene practices and tested positive of bacteria vaginosis both for the respondents surveyed during dry and wet season.

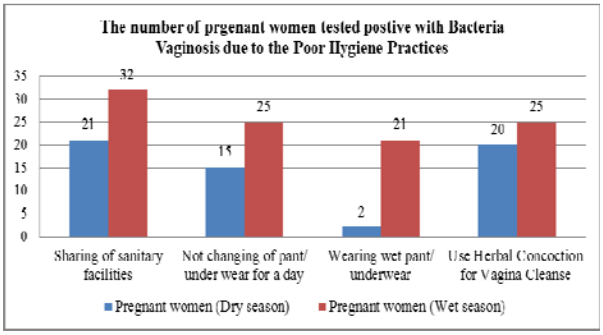

Fig 4: Showing the number of pregnant women tested positive with Bacteria Vaginosis due to Poor Hygiene Practices

The result of dry season showed twenty one (21) pregnant women, out of twenty four tested for positive for the bacterial vaginosis do share sanitary facilities both at home and in public places, fifteen (15) don't use to change their pants/underwear used in a day, two (2) do wear wet pant/underwear (not properly sun dried) and twenty (20) respondents during pregnancy use soap to clean their private parts and applied herbal concoction as their traditional demand to aid their safe delivery. On the other hand, the result obtained during wet season indicated that out of thirty five (35) respondents tested positive for the infection, thirty two (32) shared sanitary facilities also both at home and in public places with no concern for the facilities cleanliness. Then, twenty five (25) don't use to change their pants/underwear used in a day (may be the cool weather do not make them sweat like in the dry season to make them uncomfortable or due constant rainfall the washed clothes are not always dried up because lack of solar radiation), twenty one (21) do wear wet pant/underwear (not properly sun dried) and twenty five (25) respondents during pregnancy use soap to clean their private parts and also applied herbal concoction as their traditional demand to wash their private part to aid their safe delivery.

Furthermore, from the analysis of the results, the incidence rate of the infection during dry season was forty eight (48%), while it was seventy (70%) during the wet season. The results variations might be attributed to many factors ranging from the demographics characteristics of the respondents, environmental factors and hygiene practices but supported by (Bahram, *et.al*, 2009) [1] Though, the findings, coupled with local traditional beliefs among the people of the study areas using local herbs for treatment of vagina itching and douching of the vagina with local herbs with the belief of safeguard of the pregnancy and to ensure of safe delivery of the unborn baby might have contributed to the incidence of the infections. However, by simple comparison of the figures 13 above, the sharing of sanitary facilities without adequate cleanliness of these facilities might have resulted into occurrence of infections among the pregnant women both in dry and wet seasons in the study area. Though, there might still be cofounding associations of the infections and behaviours of the pregnant women.

Conclusion

Conclusively, the study has helped to identify the incidence of bacterial vaginosis among the pregnant women in the study area as health problem, with high incidence rate during the wet season and low incidence rate during the dry season. It has also provided important insight on the role of traditional beliefs and cultures of people using of local herb and concoctions as alternative means of providing medical attention for the pregnant.

There is need for health and hygiene education during ante natal programme for the pregnant women, designed to teach them about the cause, prevention and management of the vaginal infections and discourage and abuse their minds on the effects of harmful medical practices during pregnancy Based on the results of the study a number of possible policy recommendations that would enhance the preventives and control measure of the infections involving all the stakeholders like community leaders, traditionalists, herbalists and the husbands should be put in place.

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