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Detection of Human Papillomavirus Dna Among Women in Itesiwaju Local Government Area of Oyo State

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Abstract:
In most developing countries, cervical cancer is one of the most prevalent diseases, and genital Human Papillomavirus (HPV) infection is a recognized cause of this cancer. Continuously, high-risk HPV infection, particularly strains 16 and 18, has been associated to cervical cancer. Currently available in Nigeria are the HPV vaccines Cervarix and Gardasil, which respectively target two (16 and 18) and four (6, 11, 16 and 18) strains. In Itesiwaju, a rural Local Government in Oyo State, women were enrolled in this study to look for Human Papillomavirus DNA. With residents from many ethnic groups, the Community is situated on a large piece of ground. Farming and mining are the two main occupations of the locals.

All the samples tested were collected from consenting women, some who are from farming communities and mining sites, others from other occupations and visit the public health facilities all around the Local Government. Information was collected from each participant using a questionnaire that captured demographic and sexual history. Genomic DNA was extracted from samples using commercial extraction reagents. The presence of HPV was detected by PCR using a primer (PGMY09/11) targeting E6/E7 genes. The PCR products were subjected to gel electrophoresis and visualized under a UV light.

A total of the 126 samples were tested and 14 of them were positive with HPV DNA giving an overall HPV prevalence rate of 11.1% in Itesiwaju. The largest proportion of participants (43.2%) fell within the 26-35 years age group, followed by the 36-45 years age group (30.7%). The 18-25 years age group accounted for 26.1% of the respondents.

The age range of 26 to 35 had the highest number of positive cases, which indicates a higher rate of sexual activity, according to subgroup analysis. These findings highlight the need for focused measures to address HPV infection in Itesiwaju LGA, such as awareness raising campaigns, vaccination programs, and routine screening. To comprehend the dynamics of HPV transmission and create effective preventative tactics that may be unique to the study region, more investigation and joint efforts are advised.

Key Words: Human Papillomavirus, DNA, Women.

Introduction

The Human Papillomavirus (HPV), a common sexually transmitted infection, can affect both men and women. The virus causes a wide range of conditions, such as genital warts, cervical cancer, and oropharyngeal cancers. According to the World Health Organization (WHO), 80% of persons who participate in sexual activity will catch the virus at some point in their lives. HPV is the most common viral infection of the reproductive system in the world. The prevalence of HPV infection varies by country, with some regions having higher rates than others.

The importance of HPV identification and its connection to the emergence of cervical cancer have been highlighted by research from many nations. Studies carried out in various communities have consistently demonstrated a higher incidence of high-risk HPV genotypes in females with cancer and cervical lesions. These discoveries have sparked the creation of HPV vaccination campaigns and enhanced screening procedures all across the world, lowering the incidence of cervical cancer in many nations.

Cervical cancer is a substantial cause of cancer-related mortality in women in Nigeria, raising serious public health concerns. The continually high incidence of cervical cancer in the nation has been attributed to poor healthcare access, a lack of education, and cultural barriers. While research on HPV genotypes and prevalence in Nigeria is developing, additional research is required to fully estimate the local impact of HPV infection. Implementing targeted prevention and intervention methods requires an understanding of the particular HPV types that are common in various geographic areas. Cervical cancer is the second most frequent malignancy in Nigerian women, accounting for an anticipated 14,943 new cases and 10,403 fatalities in 2020 alone, like many other developing nations. (Ezechi *et al.,* 2014). It is imperative to increase awareness of the issue and create practical prevention strategies in order to combat the increased frequency of HPV-related diseases in Nigeria. 90% of HPV infections (or 9 out of 10) disappear on their own over the course of two years with the aid of the immune system because HPV typically causes no symptoms. The infected person can still unknowingly transfer HPV during this period even though the virus is still in their body. In 2003, the Centers for Disease Control and Prevention. Human Papillomaviruses can infect the skin and mucous membranes, and when symptoms start to show up, the infection may manifest as warts on the genitals or other regions of the body., swelling lesions, and high-risk HPV types 16 and 18, an infected person is at risk of developing cancer. (John, 2019)

Infection with HPV, which has been related to head and neck cancers as well as anogenital cancers (Anus, Vulva, Vagina, and Penis), is becoming more common in Oyo State. Notable is the availability of HPV vaccines that offer protection against type 16 and type 18 infections and may reduce the incidence of cervical and other anogenital cancers. Notable is the availability of HPV vaccines that offer protection against type 16 and type 18 infections and may reduce the incidence of cervical and other cancers. (HVP Information Center of the WHO/ICO, 2019). The chosen study area, Itesiwaju is a rural local government area located in the Southwestern part of Nigeria, and it shares borders with the Republic of Benin. The local government has a population of approximately 71,000 people, and most of the residents are engaged in farming and other agricultural activities. *(*National Population Commission, 2018*)*

The study area's location is of particular interest as Itesiwaju shares borders with the Republic of Benin, which is a significant HPV hotspot in West Africa. According to a study conducted by Dauda *et al.*, 2021, Republic of Benin has one of the highest HPV prevalence rates in West Africa, with an estimated prevalence of 28.2% among women aged 15-49 years. This high prevalence is attributed to factors such as low levels of HPV vaccine coverage, poor screening services, and low awareness about the virus and its associated conditions.

The study of HPV in Itesiwaju local government is, therefore, essential in understanding the burden of HPV in the area and developing appropriate interventions to prevent and manage HPV-related conditions. The study may also provide insights into the potential impact of cross-border transmission of HPV between Itesiwaju and neighboring communities in the Republic of Benin.

AIM AND OBJECTIVES OF THE STUDY.

The primary objective of this study is to determine the prevalence distribution of HPV among women in Itesiwaju LGA, Oyo State. A cross-sectional study design will be employed, involving a representative sample of women of various age groups. Participants will undergo HPV testing using molecular techniques such as polymerase chain reaction (PCR) to identify specific HPV types. Additionally, sociodemographic, and clinical data will be collected to assess risk factors associated with HPV infection.

The findings from this study will contribute to the understanding of HPV epidemiology within the local context of Itesiwaju LGA, Oyo State, Nigeria. By assessing risk factors, we can inform policymakers, healthcare professionals, and the community about the urgency of HPV prevention and early detection strategies. Ultimately, these insights will aid in the development of targeted interventions, including vaccination campaigns and improved screening programs, to reduce the burden of cervical cancer in this region.

MATERIALS AND METHOD

STUDY AREA

The study was conducted at Itesiwaju LGA, (Oke-ogun region), Oyo State, with coordinates: 8°12'25.74" N 3°31'49.04" E. A map of oyo state, with Itesiwaju can be seen in Figure 5. Conducting research on the prevalence of HPV infection in Itesiwaju LGA is crucial to improve our understanding of the epidemiology of HPV infection in this region as the prevalence of HPV infection among women in this area is not well documented. This research could help to develop effective prevention and control strategies for HPV and cervical cancer in this population. The target age group in the area were majorly adolescent females that were already childbearing age and marrying age and adult women which ranged from ages 18- 45 years.

SAMPLE COLLECTION

Self-sampling using swabs is one strategy to broaden access to HPV screening. Self-sampling is a practical and non-intrusive technique that enables people to obtain their own samples for HPV testing on their own, without the aid of a healthcare professional. It has been demonstrated that this approach raises screening rates, particularly among underserved groups that can encounter difficulties getting access to healthcare.

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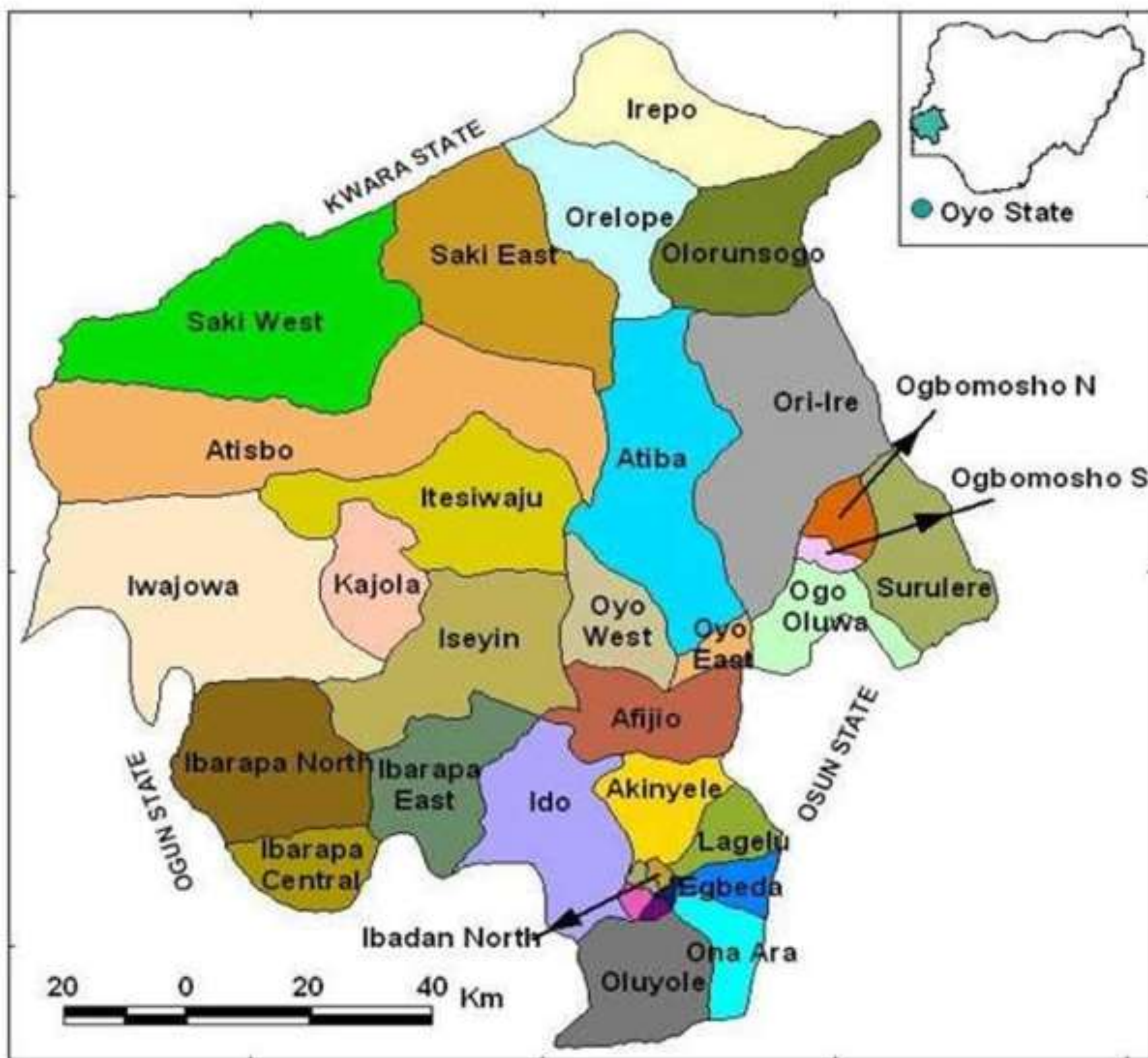

Figure 5: A map of Itesiwaju LGA and other LGAs in Oyo State. (Kehinde Oluseyi *et al., 2017*)

To implement self-sampling with swabs in the study area, some steps were taken. First, community members were educated about the importance of HPV screening and how to collect their own samples. This was done through community-based education campaigns, where healthcare providers and community leaders can provide information about HPV, its risks, and how to self-collect swab samples. Samples were collected from different areas of the LGA where different tribes and foreign settlers inhabited such as the Junkuns, Fulanis, Togolese, Beninese, Cameroonians and the Yorubas who are the major inhabitants although the population ratio of Yorubas to the settlers is almost the same.

LABORATORY-BASED STUDY

The Virology Department, College of Medicine, University of Ibadan, was the site of all laboratory-based research. In a transport medium, samples were brought into the laboratory and kept refrigerated until used.

SAMPLE ANALYSIS

Each participant's cervical swab samples were taken and put in transport medium using a sterile swab. The swabs were delivered to the lab for examination. The swab samples were used to extract DNA using a commercial DNA extraction kit.

PRINCIPLE OF EXTRACTION OF VIRAL DNA

To guarantee that the samples' accessible DNA was extracted using a commercial extraction kit from the self-collected cervical swab and transported to the lab, the following procedure was carried out.

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Precautions taken in the Laboratory.

I. Personal protective equipment, such as a lab coat, gloves were worn.
II. Care was taken not breathe in vapours or dust from iced particles.
III. Work area was sterilized using alcohol.

Lysis: After the sample is collected, the next step is to break open the cells to release the DNA. This is typically achieved using a lysis buffer containing detergents and other chemicals that disrupt the cell membrane and nuclear envelope.

Precipitation: Once the DNA is released from the cells, it is typically mixed with a precipitation reagent such as isopropanol or ethanol. This causes the DNA to clump together, allowing it to be more easily isolated from other cellular components.

Centrifugation: The mixture of DNA and precipitation reagent is then centrifuged. Upon centrifugation, particles denser than the medium will travel toward the bottom of the tube. After centrifugation, the top fraction is collected, known as the "supernatant." while the DNA forms a pellet at the bottom of the tube.

Wash: After centrifugation, the pellet is washed with a solution of ethanol to remove any remaining contaminants.

Elution: The DNA pellet is then resuspended in a buffer, typically distilled water, or a low-salt buffer, to allow for downstream analysis.

The silica-based spin column purification method is a robust and efficient technique for extracting viral DNA from clinical samples such as those collected for this study. It provides high-quality DNA suitable for downstream analysis and can be easily adapted to different sample types and volumes.

POLYMERASE CHAIN REACTION (PCR)

PCR (Polymerase Chain Reaction) is a widely used molecular biology technique that enables researchers to amplify a specific DNA sequence in a sample, making it easier to detect and analyze. The use of PCR in the detection of HPV (Human Papillomavirus) has become increasingly popular in recent years, especially in research projects that aim to determine the prevalence of HPV among women and more recently, men in a particular region.

In this research project focused on the detection of HPV among women in Itesiwaju, Oyo State, PCR was used to detect the presence of HPV in cervical swab samples that were self-collected from female participants. The PCR technique involves several steps that lead to the amplification of the target DNA sequence, which in this case would be the DNA of the HPV virus.

PRINCIPLE OF POLYMERASE CHAIN REACTION.

An effective laboratory method for amplifying a particular DNA sequence from a complicated mixture is the Polymerase Chain Reaction (PCR). PCR is used in HPV detection to amplify the virus' DNA and identify its presence in a sample. The basic idea behind PCR is to use primers that complement the sequences surrounding the target DNA region of interest. These primers serve as a starting point for the synthesis of DNA by a thermostable DNA polymerase, such as Taq polymerase. PCR typically involves three steps: denaturation, annealing, and extension.

Denaturation: Heat the DNA sample to a high temperature, typically around 95°C (or higher), to separate the double-stranded DNA into two separate strands. This step breaks the hydrogen bonds between the DNA strands, resulting in single-stranded DNA molecules.

Primer Annealing: Lower the temperature to allow primers (short DNA sequences) to bind to the specific target sequence. Primers are designed to be complementary to the sequences flanking the target region and provide a starting point for DNA synthesis. They are typically around 18-25 nucleotides long.

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Extension/Amplification: Increase the temperature to an optimal range for the DNA polymerase used in the reaction (usually around 72°C) and add a heat-stable DNA polymerase enzyme. The polymerase extends the primers by adding nucleotides to synthesize new DNA strands. This step is often called the extension or amplification step and allows the DNA to be replicated exponentially.

Cycling: This is the repeated process of denaturation, annealing, and extension steps in a cyclic manner. Typically, PCR machines perform 20 to 40 cycles of denaturation, annealing, and extension. Each cycle results in the doubling of the target DNA, leading to an exponential amplification of the desired sequence.

Final Extension: After the desired number of cycles, the reaction is typically held at a higher temperature (around 72°C) for a longer period (5-10 minutes) to ensure any remaining incomplete DNA strands are fully extended.

In HPV detection, PCR is often used to amplify a specific region of the HPV genome, such as the E6 or E7 gene. After amplification, the PCR products can be analyzed to determine if HPV DNA is present in the original sample. This can be done using techniques such as gel electrophoresis or quantitative PCR (qPCR).

PRIMERS USED FOR HPV SCREENING

PCR primers are short DNA sequences that are designed to bind to specific regions of the DNA template to initiate the amplification process. In HPV screening, PCR primers are used to detect the presence of human papillomavirus (HPV) DNA in clinical samples.

There are various PCR primer sets available for HPV screening, each targeting different regions of the HPV genome. Some of the commonly used HPV primer sets include:

PGMY09/11: This primer set targets a conserved region of the L1 gene in HPV types 6, 11, 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, and 68. This primer was used during this research.

GP5+/GP6+: This primer set targets the L1 region of a broad range of HPV types, including types 6, 11, 16, 18, 31, 33, 35, 39, 42, 45, 51, 52, 56, 58, 59, and 66.

MY09/11: This primer set targets the L1 region of HPV types 6, 11, 16, 18, 31, 33, 35, 39, 42, 45, 51, 52, 56, 58, 59, and 68.

SPF10: This primer set targets the L1 region of a wide range of HPV types, including types 6, 11, 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59.

These primer sets are commonly used in HPV screening assays and have been extensively validated for their sensitivity and specificity in detecting HPV DNA in clinical samples.

DETECTION OF PCR PRODUCTS **Principle of gel electrophoresis** The principle of gel electrophoresis is a technique used to separate and analyze macromolecules, such as DNA, RNA, and proteins, based on their size and charge. It involves the application of an electric field to a gel matrix, which allows the movement of charged molecules through the gel. They are separated by the aid of an electric field generated by the gel tank electrode connected to a power source which make negatively charged molecules migrate towards the positively charged anode. The migration flow is solely determined by the molecular weight of the nucleic acid molecules in agarose.

Gel Preparation: The DNA is isolated and preprocessed (e.g., PCR, enzymatic digestion) and made up in solution with some basic blue dye to help visualize the movement of the sample through the gel. The buffer provides a source of ions for setting up the electric field during electrophoresis. The weight-to-volume concentration of agarose in TBE buffer is used to prepare the solution. For example, if a 1% agarose gel is required, 1g of agarose is added to 100mL of TBE. The agarose percentage used is determined by how big or small the DNA is expected to be. If one is looking at separating a pool of smaller size DNA bands (<500bp), a higher percentage agarose gel (>1%) is prepared. The higher percentage of agarose creates a denser sieve to increase the separation of small DNA length differences. The agarose-TAE solution is heated to dissolve the agarose. The agarose

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TBE solution is poured into a casting tray that, once the gel solution has cooled down and solidified, creates a gel slab with a row of wells at the top. The solid gel is placed into a chamber filled with TBE buffer. The gel is positioned so that the chamber wells are closest to the negative electrode of the chamber. **Sample Loading:** The sample containing the macromolecules of interest is mixed with a loading dye, Ethidium Bromide which helps to visualize the sample during electrophoresis. The sample is loaded into wells created in the gel.

Electric Field Application: The gel is immersed in a buffer solution, which provides ions to conduct electricity. Electrodes are placed at opposite ends of the gel, and an electric field is applied across the gel by connecting the electrodes to a power supply. The negative electrode (cathode) is placed at the end where the molecules will migrate towards, while the positive electrode (anode) is placed at the opposite end.

Migration: When the electric field is applied, charged molecules in the sample will migrate through the gel. Negatively charged molecules will move towards the positively charged anode, while positively charged molecules will move towards the negatively charged cathode. The movement of molecules is influenced by their size, charge, and the pore size of the gel matrix.

Separation: As the molecules migrate through the gel, smaller molecules can move more easily through the gel matrix and therefore migrate faster, while larger molecules experience more resistance and migrate slower. This separation based on size allows different-sized molecules to be separated and visualized as distinct bands or spots on the gel.

Visualization: After the electrophoresis run is complete, the molecules are typically stained or labeled with dyes that bind specifically to the type of molecule being analyzed. This allows the visualization of the separated bands or spots. For example, ethidium bromide is commonly used to stain DNA, while Coomassie Brilliant Blue is used to stain proteins. **Analysis:** The separated molecules can be quantified and analyzed based on the relative position of their bands or spots. This information can be used to determine the size, quantity, and purity of the molecules in the sample.

Preparation of tbe buffer Tris Base of (10.8g) and Boric acid of (5.5g) were measured into a 1.0 litre conical flask using a weighing balance. 4ml of 1Mm EDTA was added, and deionized water was added to make up to 1.0L. A magnet was dropped into the conical flask and placed on the magnetic stirrer for 30 minutes to homogenize the solution. The conical flask was covered with a foil paper while stirring. The reagents dissolved in 1 litre of distilled water and stirred with mechanical stirrer to allow the solute to dissolve.,

Preparation of agarose gel To prepare 100ml of 1.5% of agarose gel, 100ml of TBE buffer was measured and poured into a conical flask. 1.5g of agarose powder was measured and suspended in the TBE buffer. This was allowed to mix and then place into the microwave for 3 minutes until the powder was properly dissolved and a clear solution was seen. This was then allowed to cool to 45°C and 5ul of ethidium bromide was added to the gel. The agarose gel was then poured into the gel tray with arranged combs and was allowed to stay for some minutes until it solidified.

Procedure of the electrophoresis After the solidification of the agarose gel, the tray barriers were removed and the gel tray containing the gel and gel comb was placed inside a gel tank containing TBE buffer, The combs were carefully removed and approximately Sul of amplicons, positive control, negative control, and DNA marker was loaded into each well. Electrical terminals were fixed, and voltage was applied to enable migration of nucleic acid towards the anode. Electrophoresis was carried out using 100v for 30mins with current of400 mA.

RESULTS

Polymerase chain reaction (PCR) analysis was performed on a total of 126 samples that were taken from respondents. The characteristics of the study population are shown in Table 4.1. Only 11.1%

(14/126) of the participants were employed in the health field, while the majority of participants were married and farmers. The age range of the respondents in the study varied between 18 and 45 years. *Table 4.2* presents the distribution of respondents across different age groups. The largest proportion of participants (43.2%) fell within the 26-35 years age group, followed by the 36-45 years age group (30.7%). The 18-25 years age group accounted for 26.1% of the respondents.

Out of the 126 samples analyzed using PCR, a total of 14 samples tested positive for HPV infection. This indicates an overall prevalence rate of 11.1% in Itesiwaju among the studied population of women aged 18 to 45 years. *Figure 6* displays some of the amplicons observed during the detection of HPV infection using Gel Electrophoresis. The results obtained from the analysis of amplicons using Gel Electrophoresis further confirmed the presence of HPV infection in the positive samples. This technique provides visual evidence of the amplified DNA fragments specific to HPV, reinforcing the accuracy of the PCR analysis.

To investigate the age-specific prevalence of HPV infection, the number of positive cases was categorized according to different age groups. *Table 4.2* displays the distribution of HPV-positive cases among the various age groups. Out of the 14 samples that tested positive to HPV infection, 4 belong to the 18-25 years age group, 7 belong to the 26-35years age group and 3 belong to the 36-45years age group. In comparing age with the number of positive samples per age group, women in the age bracket of 26-35 years happen to present with a higher rate of infection also knowing that they have the highest population ratio among the respondents.

The results obtained from the analysis of amplicons using Gel Electrophoresis further confirmed the presence of HPV infection in the positive samples. This technique provides visual evidence of the amplified DNA fragments specific to HPV, reinforcing the accuracy of the PCR analysis.

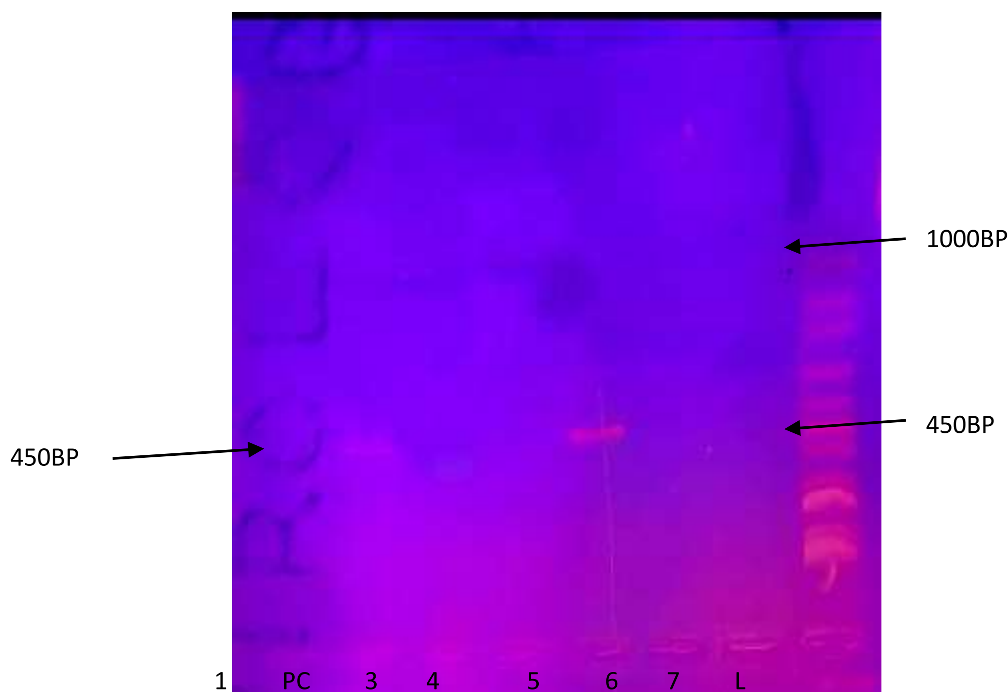

Figure 6: Gel image of PCR product showing amplification of HPV.

Band size: 450BP
Positive sample: 5
Positive control: PC

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Ladder: L

Table 1: Characteristics of study Population

Occupation / Age group	No of participants tested	Married	Health workers	Other Civil Servants	Farmers	Miners
18-25 years	33	30	2	9	12	10
26-35 years	54	46	7	10	21	16
36-45 years	39	39	5	9	18	7
Total	**126**	**115**	**14**	**28**	**51**	**33**

Table 2: Distribution of HPV infection by age of the study population.

Age group	No of participants tested	Number positive	% Positive
18-25 years	33	4	12.1
26-35 years	54	7	13
36-45 years	39	3	7.7
	126	14	11.1

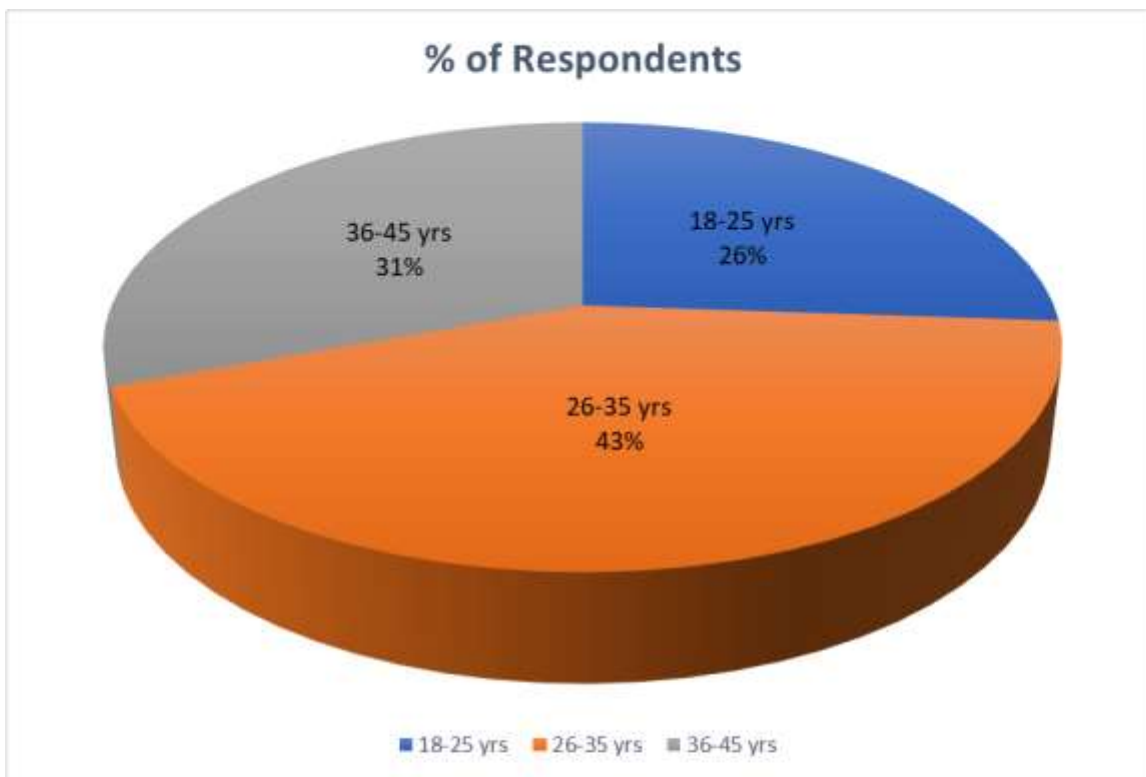

Figure 7: Distribution of respondents according to age.

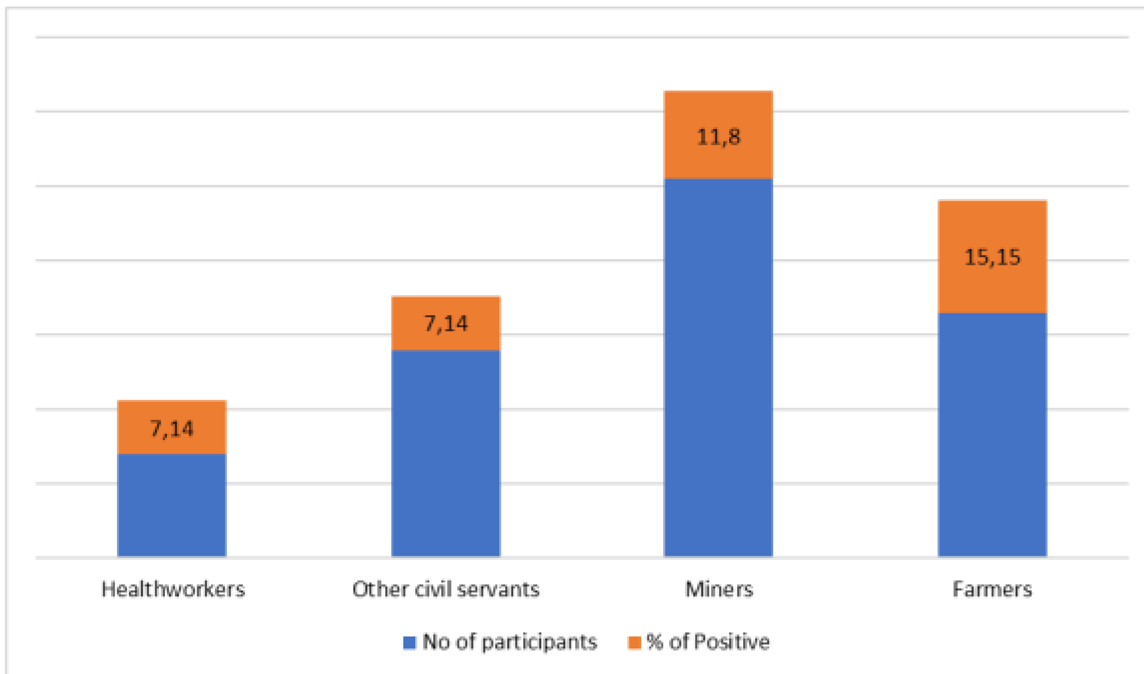

Figure 8: Distribution of positive samples within population of women according to different occupations.

DISCUSSION OF FINDINGS, CONCLUSION AND RECOMENDATION

DISCUSSION OF FINDINGS

Following analysis of 126 samples obtained from respondents, it was discovered that 14 of the samples contained HPV DNA, resulting in an overall HPV prevalence rate of 11.1%. The 26–35 age group had the highest percentage of participation (43.2%), followed by the 36–45 age group (30.7%). 26.1% of respondents were between the ages of 18 and 25. According to subgroup analysis, the age range of 26 to 35 had the largest percentage of positive cases, which is a sign of greater rates of sexual activity. This suggests that a sizable burden of HPV infection exists in the research population. This result is in line with related research carried out in nearby locations, such as Saki, also in Oyo state, as reported by (Nejo et al., 2019). These findings emphasize the urgent requirement for efficient preventative interventions and education efforts to address this public health issue in the area. To determine the statistical significance of the findings, a chi-square test was performed to assess the association between age groups and HPV infection. The results of the chi-square test revealed a significant association between age groups and HPV infection ($\chi^2 = 16.87$, df = 2, $p < 0.001$). This indicates that the prevalence of HPV infection differs significantly across the different age groups in the study population.

The age distribution of respondents in the study demonstrated that most participants fell within the 26-35 years age group, accounting for 43.2% of the sample, followed by the 36-45 years age group, comprising 30.7% of the respondents. The 18-25 years age group represented 26.1% of the total respondents. This age distribution aligns with the sexually active age range in the population under investigation.

The analysis of age-specific prevalence of HPV infection revealed interesting trends. Among the 14 samples that tested positive for HPV, four belonged to the 18-25 years age group, seven belonged to the 26-35 years age group, and three belonged to the 36-45 years age group. Notably, the 26-35 years age group exhibited the highest number of positive cases, indicating a higher rate of infection in this particular age bracket.

The higher number of positive cases among individuals in the 26-35 years age group is consistent with findings from a similar study conducted in a Lagos State population by (Ashaka *et al.*, 2022).

This observation raises important questions regarding potential risk factors or behaviors that might contribute to the increased susceptibility to HPV within this age bracket. Further investigations are warranted to delve deeper into the level of promiscuity and rate of sexual activity.

Furthermore, three positive cases were detected in the 36-45 years age group, suggesting that HPV infection persists into the middle-aged population. Although the number of cases is relatively lower compared to the 26-35 years age group, it highlights the importance of HPV screening and prevention measures throughout adulthood.

Occupational Factors and HPV Infection:

The prevalence of HPV infection was also influenced by the respondents' occupations. The positive cases included two government employees, five farmers, and six miners. Farmers and miners had a higher rate of HPV infection, which may be related to workplace exposures. The higher risk of HPV transmission may be caused by elements like working outdoors, in secluded farmland or bushes, and possibly engaging in high-risk sexual behavior. Additionally, environmental factors, such as the migration of young girls and women to Itesiwaju LGA for work purposes, including engaging in sex work, may facilitate the transmission of STDs like HPV, HIV, and HBV. These factors need to be considered in occupational health considerations and prevention strategies to address HPV infection among different working populations.

There may be a few limitations to the study such as the sample size which may have focused on the potentially sexually active age. This allows for a bit of difficulty in generalizing the result as women above 50 years may still come down with cervical cancer in later years peradventure, they have had the persistent infection.

The benefits of this study are endless and will form a baseline for other studies to build upon. **Public Health Awareness**: The study highlights the significant burden of HPV infection in the study population, emphasizing the need for effective preventive measures and awareness campaigns. By identifying the prevalence of HPV infection in the area, the study raises awareness among healthcare professionals, policymakers, and the public about the importance of HPV screening, vaccination, and safe sexual practices.

Localized Data: The study specifically focuses on Itesiwaju LGA in Oyo State, providing localized data on the prevalence of HPV infection in this region. This information can be valuable for local health authorities and policy makers in designing targeted interventions, allocating resources, and implementing preventive measures tailored to the specific needs of the population.

Contribution to Existing Literature: The study contributes to the existing body of literature on HPV infection by providing data from a region where limited research has been conducted. By corroborating the findings of previous studies conducted in neighboring areas, the study strengthens the evidence base and supports the generalizability of the results to similar populations.

Identification of Age-Specific Trends: The study identifies age-specific trends in HPV infection, with a higher prevalence observed among women in the 26-35 years age group. This finding helps healthcare professionals and researchers better understand the demographics most at risk and aids in targeting prevention strategies, screening efforts, and vaccination campaigns to the specific age groups that require greater attention.

Occupational Health Considerations: The study highlights the association between occupation and HPV infection, with higher prevalence observed among farmers and miners. This finding emphasizes the importance of considering occupational health factors in addressing HPV transmission among different working populations. It provides insights for occupational health professionals to develop guidelines, policies, and interventions to protect individuals in high-risk occupations such as localized HPV screening and vaccination in such areas. With the latest launch of the nation-wide HPV vaccination which commenced.

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Basis for Future Research: The study lays the groundwork for future research in the field of HPV infection in Itesiwaju LGA and similar settings. It identifies gaps in knowledge, such as the need for larger sample sizes, longitudinal studies, control groups, and more comprehensive statistical analysis. the study strengthens the evidence base and supports the generalizability of the results to similar populations.

This study can serve as a foundation for further investigations, allowing researchers to delve deeper into the risk factors, behavioral determinants, and socio-cultural influences associated with HPV infection in the region.

By recognizing these benefits, the study can contribute to public health efforts, inform policy decisions, guide healthcare practices, and stimulate further research to combat the burden of HPV infection in Itesiwaju LGA and beyond.

CONCLUSION AND RECOMENDATION

CONCLUSION

This research presents a thorough examination of HPV infection in the Benin Republic bordering Itesiwaju Local Government Area (LGA), Oyo State. Women between the ages of 18 and 45 provided a total of 126 samples, which were then subjected to polymerase chain reaction (PCR) analysis. The results provide information on the age distribution of respondents, the prevalence of HPV infection in the area, and Itesiwaju LGA as a whole.

14 out of the 126 samples obtained tested positive for HPV infection, according to the PCR analysis of the samples. According to this, the study population of women in the Itesiwaju LGA, aged 18 to 45, had an overall prevalence rate of 11.1%. These results demonstrate the high prevalence of HPV infection in the area, calling for attention and preventive actions. Furthermore, the results obtained from the analysis of amplicons using Gel Electrophoresis provided visual evidence of the amplified DNA fragments specific to HPV in the positive samples. This reinforces the accuracy of the PCR analysis and confirms the presence of HPV infection in Itesiwaju LGA.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to address the prevalence of HPV infection in Itesiwaju LGA, Oyo State:

Awareness and Education: Implement targeted educational campaigns to raise awareness about HPV infection, its consequences, and available preventive measures. This can be done through community-based programs, schools, healthcare facilities, and mass media platforms.

Vaccination Programs: Introduce and promote HPV vaccination programs in Itesiwaju LGA to protect individuals from high-risk HPV types. Vaccination should target the age group most affected by HPV infection, primarily women in their late twenties to mid-thirties.

Regular Screening: Establish and encourage regular HPV screening programs for women within the age range of 18 to 45 years (and above) in Itesiwaju LGA. Accessible and affordable screening services will aid in early detection, timely treatment, and reducing the burden of HPV-related diseases.

Healthcare Infrastructure: Strengthen healthcare infrastructure in Itesiwaju LGA by providing adequate resources, trained healthcare professionals, and well-equipped facilities for HPV screening, diagnosis, and treatment.

Collaborative Efforts: Foster collaborations between healthcare providers, local government authorities, community leaders, and non-governmental organizations to develop and implement comprehensive strategies aimed at reducing HPV infection rates. This can involve sharing resources, knowledge, and expertise to maximize the impact of interventions.

Surveillance and Research: Establish a system for ongoing surveillance of HPV infection rates and associated risk factors in Itesiwaju LGA. Support further research to explore additional aspects of HPV, such as genotyping, viral load, and the effectiveness of intervention strategies.

By implementing these recommendations, Itesiwaju LGA can make significant progress in combating HPV infection, reducing its prevalence, and protecting the health and well-being of its population.

The findings from this study underscore the need for proactive measures, including mitigation plans mentioned above.

REFERENCES

1. Adesina OA, Olugbenga-Bello AI, Ojemakinde OM, Adekanmbi VT, Adefisoye VA, Oyebanji AF. Prevalence and determinants of human papillomavirus infection among female undergraduate students in Ibadan, Nigeria. Pan Afr Med J. 2017; 28:213.
2. Ashaka, O.S.; Omoare, A.A.; James, A.B.; Adeyemi, O.O.; Oladiji, F.; Adeniji, K.A.; Okunade, K.S.; Agbede, O.O. Prevalence and Risk Factors of Genital Human Papillomavirus Infections among Women in Lagos, Nigeria. Trop. Med. Infect. Dis. 2022, 7, 386. https://doi.org/10.3390/tropicalmed7110386
3. Bernard HU, Burk RD, Chen Z, van Doorslaer K, Zur Hausen H. Classification of papillomaviruses (PVs) based on 189 PV types and proposal of taxonomic amendments. Virology. 2010;401(1):70-79. doi: 10.1016/j.virol.2010.02.002
4. Bosch FX, de Sanjosé S. Chapter 1: Human papillomavirus and cervical cancer--burden and assessment of causality. J Natl Cancer Inst Monogr. 2003;(31):3-13. doi: 10.1093/oxfordjournals.jncimonographs.a003479
5. Buck, C. B., & Cheng, N. (2019). Human papillomavirus (HPV) capsid protein structure and interactions with potential antiviral compounds. Current opinion in virology, 39, 117–126. https://doi.org/10.1016/j.coviro.2019.06.008
6. Centers for Disease Control and Prevention. (2022). Human Papillomavirus (HPV) and Cancer. Retrieved from https://www.cdc.gov/cancer/hpv/index.htm
7. Centers for Disease Control and Prevention. Human papillomavirus (HPV). Retrieved from https://www.cdc.gov/std/hpv/stdfact-hpv.html
8. Dauda, W., Omole-Ohonsi, A., Adewole, A., & Olaniyan, O. (2021). Prevalence and predictors of human papillomavirus infection among women attending a tertiary hospital in Benin City, Nigeria. Journal of Global Oncology, 7, 99-107. doi: 10.1200/JGO.20.00382
9. de Villiers EM, et al. (2004). Classification of papillomaviruses. Virology, 324(1), 17-27.
10. de Sanjosé S, Brotons M, Pavón MA. The natural history of human papillomavirus infection. Best Pract Res Clin Obstet Gynaecol. 2018; 47:2-13. doi: 10.1016/j.bpobgyn.2017.07.002
11. DeGuzman, P. B., Coker, A. L., Tsui, J., Eggleston, K. S., & Zaidi, A. (2020). Exploring sociodemographic and psychosocial factors associated with HPV vaccine initiation among Black women aged 18-26 years. Vaccine, 38(4), 943-950.
12. Doorbar, J. (2006). Molecular biology of human papillomavirus infection and cervical cancer. Clinical science (London, England: 1979), 110(5), 525–541. https://doi.org/10.1042/CS20050369
13. Egawa N, Egawa K, Griffin H, Doorbar J. Human Papillomaviruses; Epithelial Tropisms, and the Development of Neoplasia. Viruses. 2015 Jul 16;7(7):3863-90. doi: 10.3390/v7072802. PMID: 26193301; PMCID: PMC4517131.

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14. Ezechi, O. C., Gab-Okafor, C. V., Ostergren, P. O., et al. (2014). The burden, distribution, and risk factors for cervical oncogenic human papilloma virus infection in HIV positive Nigerian women. Virology Journal, 11, 5. doi: 10.1186/1743-422X-11-5
15. Globocan 2020. Nigeria Fact Sheet. Available from: https://gco.iarc.fr/today/data/factsheets/populations/566-nigeria-fact-sheets.pdf
16. Guan P, Howell-Jones R, Li N. Human papillomavirus types in 115,789 HPV-positive women: a meta-analysis from cervical infection to cancer. Int J Cancer. 2012;131(10):2349-2359. doi:10.1002/ijc.27485
17. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Human Papillomaviruses. Lyon (FR): International Agency for Research on Cancer; 2007. (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 90.) 1, Human Papillomavirus (HPV) Infection.
18. Jardine, A. M., & Brown, M. C. (2019). Structural insights into human papillomavirus entry, disassembly, and assembly. Annual review of virology, 6(1), 237–256. https://doi.org/10.1146/annurev-virology-092818-015642
19. Journal of the National Cancer Institute. "Watchful Waiting May Be Proper Initial Treatment For Some HPV Infections, Study Suggests." ScienceDaily. ScienceDaily, 26 March 2008. <www.sciencedaily.com/releases/2008/03/080325173302.htm>.
20. Man, Stephen. Human cellular immune responses against human papillomaviruses in cervical neoplasia. Expert reviews in molecular medicine. 1998. 1-19. 10.1017/S1462399498000210.
21. Meelis Kadaja, Toomas Silla, Ene Ustav, Mart Ustav, Papillomavirus DNA replication — From initiation to genomic instability, Virology, Volume 384, Issue 2, 2009,Pages 360-368, ISSN 0042-6822,
22. Moody CA, Laimins LA. Human papillomavirus oncoproteins: pathways to transformation. Nat Rev Cancer. 2010;10(8):550-560.
23. National Cancer Institute. (2022). HPV and Cancer. Retrieved from https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-fact-sheet
24. National Population Commission. Nigeria and ICF International. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International; 2019.
25. National Primary Health Care Development Agency. National guidelines for HPV vaccination in Nigeria. Accessed April 20, 2023. https://nphcda.gov.ng/publications/guidelines/national-guidelines-hpv-vaccination-nigeria