**HPV infections among women in the community**

**Abstract**

This was a cross-sectional, descriptive, analytical study to determine the prevalence and risk factors for HPV infection in rural areas. A total of 62 women with a median age of 37 years were included, with a higher proportion of married women (96.8%). Genotypic detection was performed by isothermal amplification using the AmpFire HPV screening 16/18/HR kit. A prevalence of 27.4% was found, with a predominance of HPV16 genotype. According to marital status, HPV infections were more frequent in married women than in widows, with a statistically significant difference (p=0.019).

**Key words:** infection, HPV, community

**Introduction**

Human papillomaviruses (HPV) are small, non-enveloped, circular, double-stranded DNA viruses belonging to the Papillomaviridae family. There are over 200 HPV genotypes (2). They infect the stratified epithelium, and can thus cause a number of potentially fatal diseases (1). They are sexually transmitted agents (STIs) with a formidable negative impact on social life. Indeed, according to the WHO, HPV infection is one of the most widespread and contagious STIs in the world, and is the leading cause of cervical cancer (3). By 2022, HPV was the fourth leading cause of cancer death in women (4). In sub-Saharan Africa, HPV prevalence is considerable, with an average frequency of 24% (5).

In Senegal, with a prevalence of 12.6%, cervical cancer is the leading gynaecological cancer and the leading cause of cancer-related death in women aged 15-44 (6),(7).

With a view to accelerating the elimination of cervical cancer, the WHO has set itself the following objectives :

- Vaccinate 90% of girls against HPV before the age of 15 ;

- screen 70% of women with a high-performance test before the age of 35, and again before the age of 45 ;

- and to treat 90% of women diagnosed with cervical disease (8).

However, despite vaccine efficacy, there has been a delay in reaching targets (9). Alongside vaccination, which provides primary prevention, early detection of the disease can ensure secondary prevention through screening and treatment of precancerous lesions to halt disease progression (10). It is in this context that this study was carried out, with a view to providing rural areas with access to a screening opportunity. The study also aimed to determine the prevalence and risk factors for HPV infection.

**Patients and methods**

**o Type of study**

This was a cross-sectional, descriptive, analytical study to determine the prevalence and risk factors for HPV infection.

**o Study setting**

The study was carried out in Koki, a village in the Louga region of northern Senegal, known for its Koranic teaching center.

**o Study period**

The study was carried out between October 19 and 20, 2024.

**o Inclusion criteria**

All women aged at least 18 years were included in the study, following free and informed consent.

**o Methodology**

After enrolment, a questionnaire was administered to participants via Google Form to collect socio-demographic data and assess risk factors.

Cervical secretion samples were then taken using cytobrushes to collect as many cells as possible. Samples were transported to the Saint-Louis regional laboratory, where HPV testing had been performed.

Nucleic acid extraction and RTPCR were performed using the AmpFire HPV screening 16/18/HR kit. This kit detects HPV 16, 18 and other high-risk genotypes (31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68).

Nucleic acid extraction was performed using the one-step process, which involved discharging the swab into 1 ml of pre-prepared lysis solution. Genotypes were detected by isothermal amplification.

Data were analyzed using SPSS IBM version 25 software. The analysis began with a descriptive study of the population, followed by a search for risk factors using Fisher's exact test and Pearson's Ki2 test.

**Results**

**Sociodemographic characteristics**

A total of 62 women were included, with a median age of 37 years and extremes ranging from 18 to 78 years. The age groups [18 to 30] and [44 to 56] were the most represented, and married women were more numerous (n=60; 96.8%) (figures 1 and 2).

Figure 1 : Age distribution of patients

Figure 2: Distribution of patients by marital status

**Distribution of patients by level of education and profession**

The majority of the study population were housewives (56.5%; 35/62), and 37% (23/62) of the women were self-employed. Most of the women had no formal education (n= 35 (56.5%)) (Table 1).

Table 1 : Distribution of participants by level of education and socio-economic status

|  |  |  |  |
| --- | --- | --- | --- |
|    |   | Number | Percent (%) |
| Niveau d'étude | No schooling | 35 | 56,5 |
| Elementary | 13 | 21 |
| Middle | 01 | 1,6 |
| Secondary | 07 | 11,3 |
| Universitary | 06 | 9,7 |
| Socio-economic status | Housewife | 25 | 40,3 |
| Liberal | 23 | 37,1 |
| Employee | 14 | 22,6 |

**Distribution of patients by gynaecological history**

Age at first intercourse was less than 20 years in the majority of cases, n= 39 (62.9%), and age at first pregnancy was greater than or equal to 20 years in 61.3% of cases (n=38) (table 2).

**Table 2 : Distribution of patients by gynaecological history**

|  |  |  |  |
| --- | --- | --- | --- |
|   |   | Number | Percent (%) |
| Age at first intercourse (year) | < 20 ans | 39 | 62,9  |
| ≥ 20 ans | 23 | 37,1  |
| Age at first pregnancy (year) | < 20 ans | 24 | 38,7  |
| ≥ 20 ans | 38 | 61,3  |

The study population consisted mainly of genitally active women n=37 (59.7%), menopausal women n=16 (25.8%). Women not using contraceptives were more numerous, with a prevalence of 59.7% (n=37) (table 3).

**Table 3: Distribution according to genital activity and contraceptive use**

|  |  |  |  |
| --- | --- | --- | --- |
|  |   | Number | Percent (%) |
| Genital period | Genital activity | 37 | 59,7  |
| menopause | 16 | 25,8  |
| peri-ménopause | 09 | 14,5  |
| Contraception | NO | 37 | 59,7  |
| YES | 25 | 40,3  |

According to the number of gestations, there were more multigestes n=32 (51.6%) and large multigestes n=19 (30, 6%). Similarly, for the number of parities, there were more multiparous n=33 (53.2%) and large multiparous n=17 (27.4%) (table 4).

**Table 4 : Distribution according to number of gestures and parity**

|  |  |  |  |
| --- | --- | --- | --- |
|  |   | Number | Percent (%) |
| Number of gestations | Large multigestes | 19 | 30,6  |
| multigestes | 32 | 51,6  |
| nulligestes | 08 | 12,9  |
| primigestes | 03 | 4,8  |
| Number of parities | Large multiparous | 17 | 27,4  |
| multiparous | 33 | 53,2  |
| nulliparous | 08 | 12,9  |
| primiparous | 04 | 6,5  |

**Analytical study**

The prevalence of HPV infection in the study population was 27.41% (17/62), with a few cases of association of different genotypes. The most common genotypes were HPV-16 (n=15; 75%), HPV-18 (n=4; 20%) and the HPV-16/HPV-18 association was present in 3 cases (17.6%) (Figure 3).

figure 3 : The IVA test was positive in 7 participants (11.3%).

**Figure 4 : IVA test results**

**Study of risk factors associated with HPV infection**

According to marital status, HPV infections were more frequent in married women than in widows, and this relationship was statistically significant at p=0.019. On the other hand, there was no relationship between age group (p=0.47), age at first intercourse (p=0.85), age at first pregnancy (p=0.35), number of gestures (p=0.13), parity (p=0.22), genital period (p=0.45), contraception (p=0.625), occupation (p=0.527), level of education (p=0.127) and HPV infection (Table 5).

**Table 5 : Distribution of HPV infection prevalence according to sociodemographic factors and gynecological history**

|  |  |  |
| --- | --- | --- |
|  | HPV | P-value |
| Negative | positive |
| Age group | 18-30 | 25 | 8 | 0,47 |
| 31-43 | 3 | 1 |
| 44-56 | 14 | 6 |
| 57-78 | 1 | 2 |
| Age at first intercourse(year) | < 20  | 28 | 11 | 0,85 |
| ≥ 20  | 17 | 6 |
| Age at first pregnancy(year) | < 20  | 19 | 5 | 0,35 |
| ≥ 20  | 26 | 12 |
| Number of parities | Large multiparous | 12 | 5 | 0,13 |
| multiparous | 25 | 8 |
| Nulliparous | 7 | 1 |
| Primiparous | 1 | 3 |
| Number of gestations | Large multigeste | 12 | 7 | 0,22 |
| multigeste | 26 | 6 |
| nulligestes | 6 | 2 |
| Primigestes | 1 | 2 |
| Genital period | Genital activity | 29 | 8 | 0,449 |
| menopause | 10 | 6 |
| Peri-ménopause | 6 | 3 |
| Contraception | NO | 26 | 11 | 0,620 |
| YES | 19 | 6 |
| Socio-economic status | Housewife | 20 | 5 | 0,527 |
| liberal | 16 | 7 |
| employee | 9 | 5 |
| Marital status | married | 45 | 15 | **0,019** |
| widowed | 0 | 2 |
| Level of education |  No schooling | 23 | 12 | 0,127 |
|  Elementary | 11 | 2 |
|  Middle | 0 | 1 |
|  Secondary | 7 | 0 |
|  University | 4 | 2 |

**Discussion**

At the end of this study, we noted a non-negligible prevalence of HPV infection of around 27.4%. This prevalence is similar to WHO observations for **sub-Saharan African** countries, with a prevalence of 24%, and higher than that found in **Latin America** and the **Caribbean** (16%), **Eastern Europe** (14%) and **South-East Asia** (14%) (8). In a **Chinese** study of the prevalence and genotypic distribution of HPV infection among women in **Xiamen**, **Shen et al.** in **2023** found a lower prevalence (15.13%) (11). However, a study carried out in **Iran in 2023** found a higher frequency (33.68%) (12). This disparity in the prevalence of cervical HPV infection between countries can be explained by socioeconomic and cultural inequalities (13). However, certain factors are known to contribute to the occurrence of HPV infections, such as early sexual activity, multiparity and sexual promiscuity (14). Indeed, **Diop-Ndiaye et al.** in **2019** found an alarming prevalence of around 79.8% among female sex workers (15).

In our study, the high prevalence noted could be explained by a lack of awareness of HPV infection, which is vaccine-preventable (16). Indeed, most of the participants were not in school (n=35, i.e. 56.40%), which may be the cause of ignorance, but also a limit to knowledge of protection by vaccination. This hypothesis is also supported by a study carried out in **Kenya** in **2014** on the determinants of acceptance and subsequent uptake of the HPV vaccine, where lack of information was reported among the barriers to vaccination (17). From another angle, fear of side effects is a major concern and is raised in several studies as a limitation to vaccination (18), (19). Another hypothesis is that the target age of the vaccination policy is school-age girls.

HPV-16 was the most common genotype, followed by HPV-18, and the HPV-16-HP-V18 association was found in 3 patients.

Our results are in line with a **French** (21) and **Yemeni** study, where HPV-16 was predominant ahead of HPV-18 (22). This almost universal distribution may be due to pathogenicity factors. Indeed, HPV-16 genotype has the highest oncogenic potential, followed by genotype 18 as the second most virulent type (23).

According to marital status, HPV infection was more frequent in married women compared to widows, and this relationship was statistically significant at p=0.019. The opposite was reported by **Onwuamah et al.** in **2023**, who found a lower prevalence of HPV in married women with a p=0.00 (24).

The prevalence of infection was higher in women aged 18 to 30, with a statistically non-significant relationship (p=0.47). A discrepancy is noted with the **2013** study by **Lee et al.** in **South Korea**, in which most HPV-infected individuals were aged over 30, with a higher prevalence in the [45-54] age group (25). This higher rate of infection in this age group of our study population would be linked to the fact that the [18-30] age group corresponds to the period of sexual activity, but also to early marriage, which is a reality in rural areas and constitutes a risk factor for HPV infections (26). This assertion is in line with the hypothesis that, due to an unsensitized immune system, women aged around 16 to 24 are still susceptible to HPV infection (27). Again, the finding of **Trottier et al**. goes in the same direction, asserting that the prevalence of HPV infection remains highest in young women (18 to 24 years) and declines progressively with age until the 4th or 5th decade (28).

According to gynecological history, infections were more frequent in women whose age at first intercourse was under 20 (p=0.85), age of first pregnancy was over 20 (p=0.35), large multigestates (p=0.13), large multiparous (p=0.22), genitally active women (p=0.45), and those not exposed to a contraceptive method (p=0.625) with the absence of a statistically significant relationship. Some authors have reported that factors such as early age at first intercourse, sexual behavior, social class, high parity, lack of contraceptive protection and long-term use of oral contraceptives are associated with an increased risk of HPV infection (29), (30).

In terms of socio-economic status and level of education, infections were more frequent among professional women (p= 0.527), women with no schooling and those with primary education (p=0.127). These results are similar to those of the Nigerian study by **Onwuamah et al.** in **2023**, where the prevalence of infection was highest among unschooled people, those with primary education, but also among people working as unskilled staff, and with a significant difference (p=0.003) (24). On the other hand, a study on the effect of health education on knowledge of cervical cancer showed that women with a higher level of education were less affected (31). The high prevalence of infection among women with a low level of education and those with a low occupational status would be linked to a lack of awareness. This hypothesis is confirmed by **Believe et al.'s 2022** study in **Nigeria** on the effect of health education on knowledge of cervical cancer, human papillomavirus and self-testing among women living in a low-resource environment, where education was reported as a crucial factor illuminating the danger of disease (32). In the same vein, women with a higher level of education and women living in urban areas are described as having a high socio-educational level and high exposure to the health service and the various media (33).

**Conclusion**

This study found a high prevalence of HPV infection in community settings. The HPV-16 genotype was the most frequent, and married status was a risk factor for infection. In this population with a low level of education, it would be essential to raise awareness, facilitate access to vaccination and promote screening as a means of secondary prevention.

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