Prevalence of high risk human papilloma virus infection in national capital region of India

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ABSTRACT

Cervical cancer is one of the most common forms of cancer in women is the second biggest cause of female cancer mortality worldwide. High-risk human papillomavirus (HR-HPV) detection holds the potential to be used as a tool to identify women, at risk for subsequent development of cervical cancer. Investigation of the prevalence of human papilloma virus infection prevent the development of cervical carcinoma especially in young women. In the present study we used Hybrid Capture II HPV Test (HCII) is a signal amplified hybridization microplate-based assay designated to detect 18 human papillomavirus (HPV) genotypes using two probe cocktails, for high-risk HPV. It was observe that 232(12.01%) were positive for HR-HPV. Sexually active young adults are most at risk for acquiring HPV. Age group 15-25 has high (18.6%) prevalence in this study. This study suggests more simple and cost-effective HPV test and immunization at early age.

Key words: Human papilloma virus, high risk HPV, cancer, cervical carcinoma, hybrid capture assay.

INTRODUCTION

Cancer of the cervix is the second most common cancer among women worldwide. In India it is the major cause of cancer in women and a leading cause of cancer deaths. The worldwide incidence of cervical carcinoma is 529,000 per year, and mortality is 275,00, of which an estimated 88% of deaths occur in developing countries. Worldwide 20 million people are chronically infected. Over 80% of cases of cervical carcinoma occur in developing countries, with 25% estimated to occur in India (1-3). More than 100 types of HPV are known, but only about 30 types are associated with anogenital cancer (4,5). The persistent infection by specific types of high-risk human papillomaviruses (HR-HPVs) is essential for the progression of cervical lesions (6-9,), and women who are infected with HR-HPVs are likely to develop cancer (10-13). Various studies have demonstrated that more than 70% of invasive cervical cancers harbor HPV type 16 (HPV-16) and HPV-18 (14,15).

The risk of acquiring anogenital human papillomavirus (HPV) infection is associated mainly with early sexual experience, number of lifetime sexual partners, and sexual contact with highly promiscuous partners (16-18). Persistent infection with HPV has been identified as the most important cause of cervical cancer (19-21).

Diagnosis of cervical cancer, indicating the presence of abnormal cervical epithelial cells, is usually obtained by microscopic examination of Papanicolaou stained smears (Pap test). This has been the method of choice since the 1950's, proving valuable for mass screening and enabling detection of lesions early enough to be treated effectively. The Pap smear, however, has limited sensitivity in detecting cancer precursors, giving a false-negative rate ranging from 20 to 30% (22). Hence, complementary methods that may enable the improvement of cervical disease
diagnosis have been studied for the past two decades. Recently developed, the second generation of the hybrid capture assay (HCA II) for HPV DNA detection from Digene Diagnostics (Silver Spring, Md), is a nonradioactive, relatively rapid, liquid hybridization assay designed to detect eighteen HPV types divided into high-risk groups. A possible unique advantage compared with other available HPV test kits, the hybrid capture test is also designed to provide quantitative estimates of viral load, which may correlate with the grade and natural history of cervical pathology (23,24).

There have been many studies from various part of the India (25-31) on the prevalence of HPV, we are the first reported the prevalence of HR-HPV from national capital region.

**MATERIALS AND METHODS**

We had received samples from 1931 women attended and different hospital in NCR region of India, from January 2009 to December, 2012. Women were referred to hybrid capture after clinical suspicion of HPV infection during a routine exam. The cervical smears were collected using a cervical cytobrush and transported in specimen transport medium (Digene Diag, Md).

**Human papillomavirus testing by hybrid capture.** The assay kit detects high-risk HPV genomes. The high-risk types are 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59 and 68. According to the kit protocol, specimens were treated with sodium hydroxide to hydrolyze the RNA specimen and denature the DNA. The liberated single strand DNA was hybridized in solution with a RNA probe mix consisting of the high-risk or the low-risk HPV types. Each reaction mixture, containing any number of RNA-DNA hybrids that formed, was transferred to a capture tube coated with antibodies to the hybrids; consequently, immobilizing them. Bound RNA-DNA hybrids were then reacted with an alkaline phosphatase-conjugated antibody directed against the hybrids. Nonreactive material was removed by washing, and a dioxetane-based chemiluminescent compound, Lumi-Phos 530, was added as a substrate for alkaline phosphatase. The light produced by the ensuing reaction was measured by a Luminometer. Light measurements were expressed as relative light units (RLU). As a negative control, sonicated herring sperm DNA in Digene transporting medium (100mg/ml) was used. Triplicate specimens of HPV 16 or HPV 11 DNA at 10pg/ml served as the positive controls for high-risk probes. All RLU measurements for specimens were divided by the mean RLU of the three appropriate positive controls (PCs) to give a ratio of specimen RLU/PC. A ratio of 1.0 or greater was regarded as positive for HPV DNA, and a ratio of less than 1.0 was regarded as negative. Since the amount of light produced by the hybrid capture assay is theoretically proportional to the amount of target HPV DNA, HCA II can be analyzed as a quantitative method (23).

**RESULTS**

In the study subjects, HR HPV DNA was detected in 232 (12.01%). Positivity was increased in recent years like in 2009(9.49%), in 2010 (11.66%), in 2011 (11.94%) and in 2012 (14.7%) shown in figure.

![Figure 1 Yearly prevalence of HPV in NCR India](image-url)
Table shows age specific HR-HPV prevalence was in women of 15-25 year group and decreased in 26-35 year and 36-45 year groups. An increased prevalence was observed in older age group i.e. more than 46 years.

<table>
<thead>
<tr>
<th>Age</th>
<th>Total</th>
<th>Positive %</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-25</td>
<td>86</td>
<td>16(18.6%)</td>
</tr>
<tr>
<td>26-35</td>
<td>815</td>
<td>99(12.2%)</td>
</tr>
<tr>
<td>36-45</td>
<td>652</td>
<td>66(10.1%)</td>
</tr>
<tr>
<td>46-55</td>
<td>268</td>
<td>73(13.8%)</td>
</tr>
<tr>
<td>56-65</td>
<td>52</td>
<td>28(10.72%)</td>
</tr>
<tr>
<td>66-75</td>
<td>28</td>
<td>3(10.72%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1931</td>
<td>232(12.01)</td>
</tr>
</tbody>
</table>

CONCLUSION

Our results support that HR-HPV infection mainly associated with early sexual experience, for high prevalence at older age indicated to multiple sexual partner or virus express symptom at this age group.

In India many findings from rural areas of south parts showed very high prevalence than our findings. Our subjects were from urban area, they take prevention and get vaccine. So, our suggestion is to vaccinate the women for HR-HPV at the age of 9-12 year. The development of a reliable, accurate, and cost-effective HPV test method is needed in order to move HPV testing into routine clinical practice. The hybrid capture test has good reliability and accuracy, although room for improvement remains. Available techniques are very costly that’s why rural women in India can not screen for it and they spread the virus in community.

REFERENCES

[22] Farthing A; Masterson P; Mason WP; Vousden KH. Journal of Clinical Pathology, 1994, 47, 649-652.
[23] Sun CA; Liu JF; Wu DM; Nieh S; Yu CP; Chu TY. International Journal Gynecology and Obstetrics, 2002, 76, 41-47.
[26] Bhatla N; Lal N; Bao YP; Ng T; Qiao YL. Vaccine, 2008, 26, 2811-7.
[31] Peedicayil A; Abraham P; Sathish N. Int J Gynecol Cancer, 2006, 16, 1591-5.