Screening for human papillomavirus infection in asymptomatic women in Hungary

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BACKGROUND: A multicentre epidemiological survey was carried out in order to determine the prevalence of, and risk factors for, persistent cervical human papillomavirus (HPV) infection in women in Hungary. METHODS and RESULTS: A total of 728 women were examined for the prevalence of HPV. The estimated overall rate of HPV infection was 17%. In univariate analysis the strongest predictors were young age (≤ 24 years), unmarried family status, smoking, a pathological Papanicolaou (Pap) smear, having a condyloma and previous gynaecological cancer in the family (age and marital status being the most important predictors). In multiple regression analysis, young age (≤ 24 years) (odds ratio /c9063 1.86, 95% confidence interval /c9063 1.19–2.90, P < 0.01), smoking (1.78, 1.17–2.71, P < 0.05), an abnormal Pap smear (6.92, 2.68–17.84, P < 0.001), having a condyloma (4.22, 1.42–12.58, P < 0.01) and living in a region where the unemployment rate is relatively high (1.56, 1.24–2.82, P < 0.01) were associated risk factors for HPV infection. CONCLUSIONS: The prevalence of HPV infection in young women in Hungary is high. Screening for HPV is suggested only in women with an unfavourable gynaecological history who are ≤ 24 years old.

Keywords: cross-sectional study/epidemiology/HPV/prevention/risk factor

Introduction

The human papillomaviruses (HPV) are regarded as some of the most important agents of cervical carcinoma (Kiviat, 1996). The prevalence of cervical carcinoma in a given population is relatively low compared with that of HPV (Koutsky, 1997). It is thought that carcinoma of the cervix can develop as a consequence of HPV infection, but that other factors are also involved. The epidemiological situation of sexually transmitted infections varies to a great extent in different countries and in different populations within a country (Ostor, 1993).

There is no nationwide registration of HPV in Hungary. In some research centres HPV diagnostic methods have been carried out, but the results are poorly documented.

In order to determine the prevalence and some of the risk factors for persistent cervical HPV infection in asymptomatic women in Hungary a two-centre epidemiological survey was carried out.

Materials and methods

Study groups

Cervical samples were collected from fertile women treated at the Department of Obstetrics and Gynaecology of the University of Szeged (Eastern Hungary) and at the Department of Obstetrics and Gynaecology of Imre Haynal University of Health Sciences (Western Hungary) from March–June 1997. Colposcopy was carried out in each case as a part of the gynaecological examination.

A questionnaire interview was performed during the clinical examination. Questions pertained to the age, occupation, lifestyle, sexual practice, health status, etc. of the patients. Participants had a cervical specimen taken for Papanicolaou (Pap) cytology and HPV testing.

HPV hybrid capture assay

Sampling, sample transport and HPV DNA determination were performed according to the assay kit instructions (HPV-HCA, Teva-Biogal RT, Vaci ut, Budapest, Hungary). In each case, sampling for cytological purposes preceded sampling for molecular diagnostics. The sensitivity and specificity of this method are estimated to be 60 and 88% respectively (Deák et al., 2000). Since these are not perfect, Bayes’ theorem was applied to estimate the prevalence of the infection. According to Bayes, the probability of disease (P[D+]) can be expressed as follows (Rogan and Gladen, 1978):

\[
P(D+) = \frac{P(T+) + P(T-|D-) - 1}{P(T+|D+) + P(T-|D-)}
\]

where P(T+) is the probability of a positive test frequency, P(T+|D+) is the probability of disease given a positive test result (sensitivity), and P(T-|D-) is the probability of lack of disease given a negative test result (specificity). Bayes’ theorem allows a sample-
Results

A total of 728 women were examined for the prevalence of HPV. The observed overall average HPV infection rate was found to be 20.1%. However, with Bayes’ correction the overall estimated prevalence of HPV infection was 16.9%.

The difference between the mean ages of the HPV-infected patients (27.8, 95% confidence interval [CI]: 26.5–29.1 years) and the non-infected women (32.1, 95 CI: 31.3–32.9 years) was statistically significant (P < 0.001). The results of the univariate unadjusted analysis of risk factors for HPV infection are shown in Table I. The strongest demographic predictors were young age (≤24 years) and unmarried family status, which are related to each other. Nevertheless, living in a region where unemployment rate is higher, smoking, having a condyloma, pathological Pap smear and previous gynaecological (cervix, endometrium carcinoma) cancer in the family were all significantly associated with infection.

In the multiple regression analysis complete information was available for 701 subjects. Comparing the full model (including all variables in the study) with other models (including reduced numbers of interactions between variables) the best model was the following (five variables were resulted as being independent predictors). The Hosmer and Lemeshow statistics for assessment of the goodness-of-fit model had a value of 9.05 with 8 df (P = 0.338). Odds ratios (OR) for each of the five were calculated. Young age (≤24 years old) (OR = 1.86, 95 PCI = 1.19–2.90, P < 0.01), smoking (1.78, 1.17–2.71, P < 0.05), an abnormal Pap smear (6.92, 2.68–17.84, P < 0.001), having a condyloma (4.22, 1.42–12.58, P < 0.01) and living in Eastern Hungary, where the unemployment rate was relatively high (1.56, 1.24–2.82, P < 0.01), were significant predictors of HPV infection.

Discussion

Cervical carcinoma is a significant health problem worldwide, being the second most common cancer among women, ranking first in many developing countries. In 1996 >15 000 new cervical carcinomas were detected (Rogers et al., 1999). Cervical cancer is estimated to cause 500 000 deaths each year worldwide (Bosch et al., 1995). The public health impact of controlling precursor cervical lesions and cancer is potentially huge, especially in developing countries where the incidence of cervical cancer approaches 40 per 100 000 women. A number of important epidemiological risk factors have been

Table I. Univariate analysis of risk factors associated with cervical HPV infection among 728 women living in Hungary

<table>
<thead>
<tr>
<th>Region</th>
<th>No. of cases</th>
<th>HPV positive</th>
<th>% infection</th>
<th>Odds ratio (95% CI)</th>
<th>Probability level</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>329</td>
<td>91</td>
<td>27.7</td>
<td>1.57 (1.26–1.95)</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>West</td>
<td>398</td>
<td>55</td>
<td>13.8</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;24</td>
<td>216</td>
<td>66</td>
<td>30.6</td>
<td>1.97 (1.48–2.62)</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>≥24</td>
<td>509</td>
<td>79</td>
<td>15.5</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Family status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>317</td>
<td>83</td>
<td>26.2</td>
<td>1.15 (1.06–1.24)</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Married</td>
<td>410</td>
<td>63</td>
<td>15.4</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>199</td>
<td>56</td>
<td>28.1</td>
<td>1.15 (1.05–1.27)</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>No</td>
<td>528</td>
<td>90</td>
<td>17.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Gynaecological cancer in family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td>16</td>
<td>66.7</td>
<td>2.44 (1.39–4.38)</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>No</td>
<td>699</td>
<td>130</td>
<td>18.6</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Cervical sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pathological</td>
<td>17</td>
<td>10</td>
<td>58.8</td>
<td>1.96 (1.11–3.47)</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Normal</td>
<td>709</td>
<td>136</td>
<td>19.2</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>History of Papanicolaou smear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pathological</td>
<td>17</td>
<td>7</td>
<td>41.2</td>
<td>1.37 (1.01–2.05)</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Normal</td>
<td>688</td>
<td>134</td>
<td>19.5</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

An odds ratio of 1.0 indicates reference category. Data missing in up to 22 cases.
identified as contributing to the development of invasive cervical carcinoma (Burk et al., 1996; Ylitalo et al., 2000). Of key importance is infection with HPV, which is the primary risk factor. Pathogenesis suggests new strategies for preventing and treating cervical dysplasia and cancer (Parkin, 1997; Lawson et al., 1998).

It is necessary to estimate the true prevalence of HPV infection because detection and treatment of asymptomatic cases have a major impact on the incidence of HPV infection, these asymptomatic individuals being an active source of new infections (Kadish et al., 1997; Lacey et al., 1999). In epidemiology, several methods have been suggested to correct for measurement error. In our analyses, a Bayesian approach was employed for such correction.

This cross-sectional study investigated the associated factors relating to genital HPV. The overall prevalence of positive test HPV cases among 728 women was 20.1%, which corresponds to a corrected estimated infection rate of 16.9%. There were significant differences in the proportions of HPV infection in the different regions. A significantly higher HPV infection rate was identified in the Eastern region of Hungary (27.7%), where an increased rate of unemployment has been observed over the last few years. Additionally, in our survey, women \( \leq 24 \) years of age exhibited a particularly high risk of infection. Similar to others, we found that the risk of an abnormal Pap smear increased with persistent HPV infection (Brisson et al., 1994; Ho et al., 1998).

The follow-up of HPV-positive cases of our study (unpublished data), in accordance with literature, confirm that the risk of HPV infection can be reduced and the subsequent risk of cervical cancer lowered by a later start of sexual life, a monogamous marriage or permanent relationship and a non-smoking lifestyle (Moscicki et al., 1998).

Acknowledgements

We express our sincere gratitude to Dr Ildikó Jakab and Dr Judit Jármai for their help and organization to accomplish this work.

References


Received on February 1, 2001; accepted on July 9, 2001

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