

## Original Article

# Determinants of HPV-Positive Male's Knowledge and Attitudes Towards HPV Vaccination

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### Abstract

**Background:** Human papilloma virus (HPV) is a sexually transmitted virus that infects both males and females. Nowadays, there is a vaccine available which protects at almost 100% against genital warts and cancerous lesions caused by HPV.

**Aim:** To assess the level of knowledge and males' attitudes towards HPV vaccination. Moreover, we investigated potential determinants of HPV positive males' knowledge and attitudes.

**Methods:** We conducted a cross-sectional study in Greece including 60 males. A convenience sample was obtained. Data were collected from September 2020 to March 2021. We informed participants about the study design and aim, and they gave their written informed consent to participate. We applied the guidelines of the Declaration of Helsinki in our study. Data collection was performed in an anonymous way. We considered age, educational level, occupational status, marital status, children, nationality and financial status as potential determinants. We measured males' knowledge and attitudes towards HPV vaccination with the vaccination & Hpv Knowledge (THiNK) questionnaire.

**Results:** Mean score for knowledge of HPV infection was 4.3 indicating a very good level of knowledge. Participants had a very good level of knowledge about vaccines (mean score of 4.2). Attitudes towards HPV vaccination were very positive (mean score 4.6). Among our participants, 18.3% have been vaccinated against HPV. The most frequent reasons for a decline were insufficient information (51.7%) and vaccination cost (23.3%). Moreover, 85% of males were positive to get vaccinated against HPV, and 83.5% wanted more information about HPV vaccination. Increased educational level and increased financial status were associated with higher level of knowledge and more positive attitudes towards HPV vaccination. Singles and employees were more informed and positive about HPV vaccination. Increased age was related with lower level of knowledge and less positive attitudes towards HPV vaccination.

**Conclusions:** It is necessary to educate males about the importance of HPV vaccination. Healthcare workers' role is crucial since they can inform their clients about the essential role of prevention and vaccination in order to reduce the virus dispersion to both males and females.

**Keywords:** males, knowledge, vaccination, human papilloma virus, attitudes

## **Introduction**

Human papilloma virus (HPV) infection is considered the commonest heterosexual and homosexual sexually transmitted infection globally (Weaver 2006; Dunne et al., 2013; Stathopoulos et al., 2020). Low-risk HPV subtypes are associated with genital warts, whereas persistent infection with high-risk HPV 16 and 18 subtypes is closely associated with premalignant and invasive lesions in the anogenital and oropharyngeal region. E6 and E7 genes are the main drivers of oncogenic transformation in cervix since they promote all aspects of cancer hallmarks. Importantly, the implementation of screening has reduced the HPV-associated disease burden. Vaccination programmes have shown high effectiveness in preventing HPV infection and HPV-related lesions, whereas their future implementation on a larger scale would further enhance our primary prevention strategies (Stathopoulos et al., 2020).

While much is known about the natural history of cervical HPV infection and its consequences, relatively little is known about the natural history of anogenital HPV infection and diseases in males. Anal HPV infection and disease also remain poorly understood. However, it is important to be studied due to the burden of disease in males, who may develop both penile and anal cancer, particularly among HIV-positive men who have sex with men. Improved sampling techniques of the male genitalia should provide important information on the natural history of HPV infection and disease in men, including risk factors for HPV acquisition and transmission (Palefsky, 2007).

Consistent with the knowledge gap hypothesis, awareness and knowledge have been studied in relation to gender, age, education, and other important sociodemographic factors (Blake et al., 2015; Smith et al., 2015). Models have been used to correlate knowledge about HPV, including race/ethnicity, household income, census tract, health insurance, regular provider, Internet use, and personal cancer history (Mohammed et al., 2018; Kim et al., 2022). The level of knowledge has also been studied regarding the vaccination status of family members or friends. Finally, the relationship of trust with the medical community and

previous sexual experience are considered predictors of vaccine uptake (Liu et al., 2020).

HPV vaccine has proven to play a major role in preventing sexually transmitted diseases and related cancers among both men and women (Brianti et al., 2017; Serrano et al., 2018; Lekoane et al., 2019). However, the coverage of the HPV vaccination is still limited. Strengthening health education on the HPV vaccination and finding appropriate ways to solve the problem of "vaccine hesitancy" will be effective in improving the coverage of the HPV vaccine and preventing related diseases. In addition, the lifting of restrictions on HPV vaccination for males may also prove useful (Ran et al., 2022).

Few countries have recommended male vaccination on the basis that this is not cost effective (Newman et al., 2013, Stanley, 2014). However, gender-neutral vaccination has been recommended in the USA, Canada, Austria, and Australia and recently in Greece (Newman et al., 2013; Athanasiou et al., 2020; Kechagias et al., 2022). Public health campaigns that promote positive HPV vaccine attitudes and awareness about HPV risk in males, and interventions to promote healthcare provider recommendation of HPV vaccination for boys and mitigate obstacles due to cost and logistical barriers may support HPV vaccine acceptability for males. Future investigations employing rigorous designs, including intervention studies, are needed to support effective HPV vaccine promotion among males (Newman et al., 2013).

Several studies (Fontenot et al., 2016; Grace et al., 2018; Ejaz et al., 2022; Yao et al., 2022) showed that most males described a lack of prior knowledge of health consequences of HPV and highlighted financial barriers to accessing vaccines. Males did not articulate concerns about vaccine safety. Males frequently reported initial beliefs that HPV was predominantly-or exclusively-a risk for females or young girls, and thus they had not considered the vaccine to be necessary. Some participants remained uncertain if the current availability of the vaccine, and their newly acquired knowledge of its importance, was "too little, too late" because of their age and/or HPV exposure. The majority of males had not heard of anal Papanicolaou (Pap) smear and did not know that there is a vaccine against

HPV and anal cancer. Knowledge was slightly better in HIV-positive males in comparison with HIV-negative ones (Bjekic et al., 2016).

Until now, studies have focused on HPV-high risk males' populations and none on populations of purely HPV-positive males. Furthermore, only one study has investigated high risk males' knowledge about HPV vaccination in Greece (Hoefer et al., 2018). Thus, the aim of our study was to assess the level of knowledge and males' attitudes towards HPV vaccination. Moreover, we investigated potential determinants of HPV positive males' knowledge and attitudes.

## Methods

**Study design and participants:** We conducted a cross-sectional study in Greece including 60 males aged 18-26 years.

Response rate was 75% (60 out of 80). A convenience sample was obtained. Data were collected from September 2020 to March 2021. We informed participants about the study design and aim, and they gave their written informed consent to participate. We applied the guidelines of the Declaration of Helsinki in our study. Data collection was performed in an anonymous way.

**Measures:** We considered age (continuous variable), educational level (elementary school, high school, university degree, MSc/PhD diploma), occupational status, marital status (married or single), children (no or yes), nationality (Greek or other), and financial status (very poor, poor, moderate, good, very good) as potential determinants of knowledge and attitudes of males towards HPV vaccination.

We measured males' knowledge and attitudes towards HPV vaccination with the vaccination & Hpv Knowledge (THinK) questionnaire (Matranga et al. 2019). The THinK includes 16 items and three factors: knowledge about vaccines, knowledge of HPV infection, and attitude to be vaccinated against HPV. In our study, Cronbach's alpha for the THinK was 0.753 indicating acceptable reliability. Each factor takes values from 1 to 5 with higher values indicate higher levels of knowledge and more positive attitudes towards HPV vaccination.

**Statistical analysis:** We use numbers and percentages to present categorical variables,

and mean and standard deviation to present continuous variables. Kolmogorov-Smirnov test and Q-Q plots showed that continuous variables followed normal distribution. We assessed relationships between socio-demographic characteristics and THinK score using independent samples t-test, Pearson's correlation coefficient, and Spearman's correlation coefficient. P-values less than 0.05 were considered as statistically significant. Statistical analysis was performed with the IBM SPSS 21.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.).

## Results

Study population included 60 males with a mean age of 24.2 years (standard deviation=2.4). The majority of participants possessed a university degree, while 15% of them had also a MSc/PhD diploma. Most of males were employees (73.3%), singles (93.3%), without children (100%), and Greek (98.3%). Among our participants, 55% reported their financial status as moderate, 23.3% as poor/very poor, and 21.7% as good/very good. Detailed socio-demographic characteristics of males are shown in Table 1.

Descriptive statistics for the THinK questionnaire are shown in Table 2. Mean score for knowledge of HPV infection was 4.3 indicating a very good level of knowledge. Similarly, participants had a very good level of knowledge about vaccines with a mean score of 4.2. Moreover, attitudes towards HPV vaccination were very positive since the mean score on this factor was 4.6.

Among our participants, 18.3% have been vaccinated against HPV. The most frequent reasons for a decline were insufficient information (51.7%) and vaccination cost (23.3%). Moreover, 85% of males were positive to get vaccinated against HPV, and 83.5% wanted more information about HPV vaccination. In our sample, 18.3% have not ever heard about HPV vaccination, and 18.4% did not know lesions related to HPV infection. Also, the majority of males were positive for children's vaccination (98.3%) and adults' vaccination (95.0%). Among our samples, 53.4% reported that they did not know the available vaccines and 38.3% reported that they did not know how to get vaccinated.

Relationships between socio-demographic characteristics and THinK score are shown in Table 3. Increased educational level and increased financial status were associated with higher level of knowledge and more positive attitudes towards HPV vaccination.

Singles and employees were more informed and positive about HPV vaccination. Moreover, increased age was related with lower level of knowledge and less positive attitudes towards HPV vaccination.

**Table 1. Socio-demographic characteristics of males (n=60).**

| Characteristics                      | N    | %     |
|--------------------------------------|------|-------|
| <b>Age, mean, standard deviation</b> | 24.2 | 2.4   |
| <b>Educational level</b>             |      |       |
| High school                          | 21   | 35.0  |
| University degree                    | 30   | 50.0  |
| MSc/PhD diploma                      | 9    | 15.0  |
| <b>Employees</b>                     |      |       |
| Yes                                  | 44   | 73.3  |
| No                                   | 16   | 26.7  |
| <b>Marital status</b>                |      |       |
| Married                              | 4    | 6.7   |
| Singles                              | 56   | 93.3  |
| <b>Children</b>                      |      |       |
| Yes                                  | 0    | 0.0   |
| No                                   | 60   | 100.0 |
| <b>Nationality</b>                   |      |       |
| Greek                                | 59   | 98.3  |
| Other                                | 1    | 1.7   |
| <b>Financial status</b>              |      |       |
| Very poor                            | 3    | 5.0   |
| Poor                                 | 11   | 18.3  |
| Moderate                             | 33   | 55.0  |
| Good                                 | 13   | 21.7  |
| Very good                            | 0    | 0.0   |

**Table 2. Descriptive statistics for the THiNK questionnaire.**

| Scale                                  | Mean | Standard deviation | Median | Minimum value | Maximum value |
|--|------|--------------------|--------|---------------|---------------|
| Knowledge of HPV infection             | 4.3  | 0.5                | 4.4    | 2.6           | 5             |
| Knowledge about vaccines               | 4.2  | 0.6                | 4.4    | 2.0           | 5             |
| Attitudes to be vaccinated against HPV | 4.6  | 0.6                | 5.0    | 3.0           | 5.0           |

**Table 3. Relationships between socio-demographic characteristics and THiNK score.**

| Characteristics   | Mean THiNK score (standard deviation) | P-value                  |
|-------------------|---------------------------------------|--------------------------|
| Age               | -0.016 <sup>a</sup>                   | 0.905 <sup>a</sup>       |
| Educational level | 0.291 <sup>b</sup>                    | <b>0.024<sup>b</sup></b> |
| Employees         |                                       | 0.870 <sup>c</sup>       |
| Yes               | 4.4 (0.5)                             |                          |
| No                | 4.3 (0.3)                             |                          |
| Marital status    |                                       | <b>0.190<sup>c</sup></b> |
| Married           | 4.1 (0.6)                             |                          |
| Singles           | 4.4 (0.4)                             |                          |
| Financial status  | 0.061 <sup>b</sup>                    | 0.642 <sup>b</sup>       |
| HPV vaccination   |                                       | 0.736 <sup>c</sup>       |
| Yes               | 4.4 (0.4)                             |                          |
| No                | 4.4 (0.4)                             |                          |

<sup>a</sup> Pearson's correlation coefficient <sup>b</sup> Spearman's correlation coefficient <sup>c</sup> independent samples t-test

## Discussion

We conducted a cross-sectional study in Greece to assess the level of knowledge and males' attitudes towards HPV vaccination. Additionally, we investigated the potential determinants of HPV positive males' knowledge and attitudes. To the best of our knowledge this is the first study on this issue in Greece.

We found that the most frequent reasons for a decline were insufficient information and vaccination cost. Literature supports this finding since several studies in Greece, Italy, China, USA, Serbia, Pakistan found positive

relationship between higher level of knowledge and increased financial status with more positive attitudes towards HPV vaccination (Fontenot et al., 2016; Bjekic et al., 2016; Giuliani et al. 2016; Grace et al., 2018; Hoefler et al., 2018; Yao et al., 2022; Ejaz et al., 2022).

In particular, Grace et al. (2018) found a lack of prior knowledge of the health consequences of HPV and financial barriers to vaccine access, in a sample of 25 Gays, Bisexual and Men who had sex with men (GBM) in Toronto/USA living with HIV. Improving access and uptake of HPV vaccination requires addressing both



economic barriers to access and increasing levels of HPV health literacy. Also, Fontenot et al. (2016) studied a diverse sample of 34 young men who had sex with men (YMSM) and themes identified included low HPV knowledge and awareness, positive vaccine beliefs, and perceived stigma. Moreover, Bjekic et al. (2016) found the same relationship between level of knowledge and positive attitudes towards HPV-vaccination in Serbia. In Ejaz's et al. (2022) recent study, a total of 38 men and 10 transgender women were recruited from community-based organization (CBO) in Pakistan and the main perceived barriers to access HPV prevention included anticipating patient/parent concerns or refusal, lack of clear instructions, time constraints, cost and challenges to access public health care services or openly discussing one's sexual orientation with health care providers. Participants highlighted the importance for more professional, unbiased staff attitudes that respect patients' integrity, confidentiality and privacy. According to Hoefer et al. (2018), in a sample of 298 males between the ages of 18 and 55 were enrolled from the STI and HIV clinics in Greece, HPV vaccine acceptability is high despite lack of vaccine promotion to Greek males. Higher income levels were associated with increased willingness to vaccinate oneself. HCPs are vital advocates for patients and the public, but studies indicated a prevalence of provider hesitancy pertaining to inadequate knowledge, low vaccine confidence, and suboptimal uptake themselves (Lin et al., 2021).

Our study had several limitations. First, we collected data through a self-administrated questionnaire. Thus, an information bias is probable in our study. Second, we used a convenience sample and therefore it is less likely to be representative of a population of men in Greece. Third, we performed a cross-sectional study in a sample of males aged 18-26 years who visited a dermatological center. Therefore, selection bias is probable since men without access to this health care system cannot participate in our study. Fourth, we conducted a cross-sectional study and causal relationship between knowledge and positive attitude towards HPV-vaccination cannot be established. Fifth, we measured several

demographic characteristics of men but many others could be examined in future research.

In conclusion, we found a relationship between level of knowledge about vaccines and positive attitudes towards HPV vaccination. Singles and employees were more informed and positive about HPV vaccination. Moreover, increased age, low educational level and decreased financial status were related with lower level of knowledge and less positive attitudes towards HPV vaccination. Efforts should be made to maximize awareness of HPV, especially as a causative agent of genital warts and male cancers, and to reinforce positive attitudes toward vaccination among men visiting STI centers.

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