RESEARCH ARTICLE

# English-language videos on YouTube as a source of information Human Papilloma Virus vaccination

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## Abstract

**Objective:** To assess the quality of information presented in YouTube videos about human papillomavirus vaccination.

**Method:** The descriptive study was conducted at Konya Meram Education and Research Hospital, On October 15, 2019 when the YouTube website was search using the terms 'human papillomavirus', 'HPV vaccine' and 'Gardasil'. The vide-os were recorded to a playlist by two individual gynaecologists to prevent any change in the listed videos. The videos were categorised into 3 groups; useful in-formation group A, misleading information group B and insufficient information group C. The quality of the videos was scored using global quality scale from 1 = poor quality to 5 = excellent quality. DISCERN scale was used for reliability. A 10-point scale was used to evaluate comprehensiveness of the videos. Data was analysed using SPSS 20.

**Results:** Of the 200 videos assessed, 179(89.5%) were analysed. There were 17(9.5%) videos in group A, 38(21.2%) in group B and 124(69.3%) in group C. Mean global quality scale score was 3.94±1.39 group A, 1.84±0.59 group B and 3.13±0.94 group C ($p<0.001$). Mean reliability values were 4.18±1.13group A, 1.66±0.66 group B and 3.03±0.87 group C ($p<0.001$). Comprehensiveness scores were 6.94±2.49 group A, 1.53±0.95 group B and 4.87±1.72 group C ($p<0.001$).

**Conclusion:** Professional organisations, university channels and doctors should provide accurate, unbiased and evidence-based information on YouTube for community awareness.

**Key Words:** HPV vaccine, Health information on YouTube, e-health, Health communication.

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## Introduction

Human papillomaviruses (HPV) are sexually-transmitted viruses having more than 200 types that infect only humans. Depending on the type, HPV infects various body sites and causes anogenital and oropharyngeal diseases ranging from benign warts to cervical, genital and head and neck cancers in both males and females[1].

Since the discovery of HPV vaccines, HPV-related diseases have become preventable. There are 9-valent, quadrivalent or bivalent HPV vaccines available against cancers caused by HPV infection. The Advisory Committee on Immunisation Practices (ACIP) and the Centres for Disease Control (CDC) recommend vaccination for individuals aged 11-12 years before HPV exposure, and catch-up vaccination is recommended until the age of 26 years with 9-valent HPV vaccine[2]. If adolescent immunity is weak or the HPV vaccine series is started at age ≥15 years, three doses of HPV vaccine are recommended. Besides, adults can take the vaccine until 45 years of age after consultation with healthcare providers (HVPs)[3,4]. Although there are many HPV vaccination programmes worldwide, a lack of knowledge about HPV vaccines is reported, and initiation and completion of vaccine rates have been suboptimal, with security concerns and lack of awareness being the most common factors behind low HPV vaccine rates[5]. With the wide-spread use of the internet all over the world, people's reach to information has become easier. Today, the increasing use of the internet and access to information online have led to the change of the old methods used to solve people's health issues[6]. However, misleading information leads to disruption in the immunisation of society and individuals, and can lead to critical health problems[7].

There are some studies assessing the quality, accuracy and comprehensiveness of YouTube website (www.youtube.com; YouTube LLC, San Bruno, CA) videos about HPV vaccine in English language[8-10], but incorrect or insufficient information available on YouTube about HPV vaccine has not been analysed. The current study was planned to fill the gap by evaluating information related to HPV vaccine available in the shape of YouTube videos.

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## Materials and Methods

The descriptive study was conducted at Konya Meram Education and Research Hospital, On October 15, 2019 when the YouTube website was search using the terms 'human papillomavirus', 'HPV vaccine' and 'Gardasil'. Approval was not required from the ethics review board as no human or animal intervention was involved. Studies have shown that the first 3 pages in the search results happen to be the most watched ones among internet users[11]. The first 200 videos were recorded to a playlist by two individual gynaecologists to prevent the change of the listed videos because search results may progressively change on YouTube. Video searches were performed without registration in the browsers' private browsing mode to avoid bias. Two blinded reviewers excluded repetitious, irrele-vant videos and those that were not in English language or had no audio.

The videos were evaluated on the basis of input from independent doctors who did not participate in the study. The videos were categorised into 3 groups; useful information group A, misleading information group B and insufficient infor-mation group C. The categorisation was done in line with literature[12].

For each video analysed, data included the total number of views, the total duration of the content, and the length of time for which the video had been available online. Viewer interaction with the video was assessed by daily view rate which is calculated as total views for the video divided by the number of days on YouTube, number of 'likes', 'dislikes' and comments[12-14].

The source of the videos was classified into 5 categories: verified government and news agencies; private or public university channels, professional health organisations, non-profit physician and physician groups; stand-alone health information websites without any connection; medical advertisements/for-profit companies; and individuals.

Videos were also segregated in terms of target audience, like females, males or gender-neutral, as well as according to the speaker type, as physician, non-physician health provider or layperson in the video and voiceover.

DISCERN tool was used for reliability assessment[15], while the quality of the videos was scored using global quality scale (GQS) from 1 = poor quality to 5 = excellent to evaluate the flow and facility of use of the information provided in the video[17]. Besides, a 10-point scale was used to evaluate comprehensiveness of the videos in line with a framework designed using CDC, ACIP and the American College of Obstetricians and Gynaecologists (ACOG) guidelines[2, 16]. (Table 1).

**Table-1:** Tools for analysing the reliability, comprehensiveness and global quality scale of human papillomavirus (HPV) vaccination videos on YouTube.

| |
|---|
| **Reliability (1 point per question if answered yes)** |
| 1. Are the explanations given in the video clear and understandable? |
| 2. Are useful reference sources given? (Publication cited, from valid studies) |
| 3. Is the information in the video balanced and neutral? |
| 4. Are additional sources of information given from which the viewer can benefit? |
| 5. Does the video evaluate areas that are controversial or uncertain? |
| **Comprehensiveness (1 point per each covered-on video)** |
| 1.HPV (Human Papilloma Virus) is the most common virus that sexually transmitted |
| 2.HPV affects both male and female. |
| 3.HPV causes cervical, vulvar and vaginal cancer in women, penile, anal and oral cancer in men. |
| 4. HPV vaccination is preventing cancer-causing infections and pre-cancers. |
| 5. Two doses of HPV vaccine are recommended for ages 11-12; The vaccine can be given as early as age 9. |
| 6. Children who start the vaccine series on or after their 15th birthday need three shots given over 6 months. |
| 7. Compensatory vaccination is recommended for adolescents and adults aged 13 to 26 who have not previously been vaccinated or who have not completed the vaccine series. |
| 8.HPV vaccine can be given to anyone aged 26-45 if not vaccinated. |
| 9. Even if a patient previously has had an abnormal Pap test or history of genital warts, the vaccine is still recommended. |
| 10.HPV vaccine is safe and effective. |
| **Global Quality Scale (GQS)** |
| 1. Poor quality, poor flow, most information missing, not helpful for patients |
| 2. Generally poor, some information given but of limited use to patients |
| 3. Moderate quality, some important information is adequately discussed |
| 4. Good quality good flow, most relevant information is covered, useful for patients |
| 5. Excellent quality and excellent flow, very useful for patients |

Data was analysed using SPSS 20. Descriptive data was expressed as mean and standard deviation (range) for continuous variables. Categorical variables were expressed as frequencies and percentages. Kolmogorov-Smirnov test was used to analyse normality of quantitative data. Analysis of variance (ANOVA) test was used for comparison of groups with respect to non-normally distributed continuous variables. $P<0.05$ was considered statistically significant.

## Results

Of the 200 videos assessed, 179(89.5%) were analysed. There were 17(9.5%) videos in group A, 38(21.2%) in group B and 124(69.3%) in group C (Figure).

Views per day, length of time of the videos on YouTube, likes, dislikes and comments were not significantly different among the groups($p>0.05$). The groups were significantly different when in terms of video length ($p=0.027$) (Table 2).

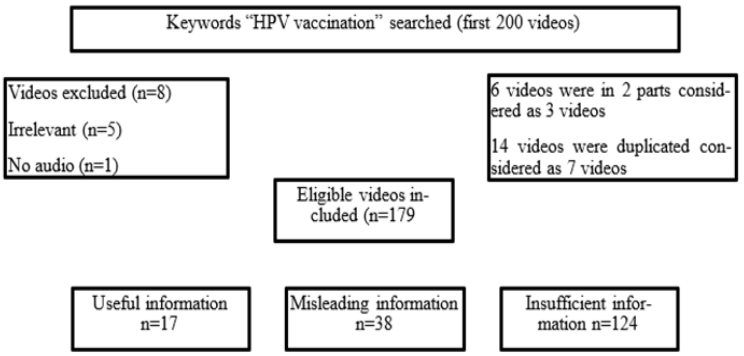


**Figure:** video selection flowchart.
HPV: Human papillomavirus

**Table-2:** Assessment of needs in Health Professions Education according to faculty track.

| Characteristic | Useful information | Misleading Information | Insufficient information | *P value* |
|---|---|---|---|---|
| Video number, n (%) | 17 (9.5%) | 38 (21.2%) | 124 (69.3%)I | |
| Audience interaction parameters | | | | |
| Total view* | 2403 (1100-15287) | 2091(737-10947) | 1888 (676-5825) | 0.530 |
| Views per day* | 8 (2-30) | 2 (0-9,25) | 2 (0-7,25) | 0.119 |
| Video length (min)* | 2,33 (1,44-4,15) | 1,36 (0,48-2,27) | 2,08 (1,28-3,26) | 0,027 |
| Duration on youtube month* | 23 (6-55) | 39 (20-65) | 34,5 (13,8-62,3) | 0,280 |
| Likes* | 11 (5-106) | 6,5 (1,25-31,5) | 5 (1-18,5) | 0,133 |
| Dislikes* | 5 (3-18) | 6 (1-11,8) | 3 (0-9,75) | 0,154 |
| Comments* | 4 (1-78,5) | 3 (0-16) | 2 (0-7) | 0,365 |
| Reliability score ** | 4,181,13 | 1,660,66 | 3,030,87 | 0,001 |
| Comprehensiveness score** | 6,942,49 | 1,530,95 | 4,871,72 | 0,001 |
| GQS score** | 3,941,39 | 1,840,59 | 3,130,94 | 0,001 |
| Source of upload,n (%) | | | | 0,0725 |
| Government/news agencies | 7 (41.2%) | 14 (36.8%) | 40 (32.5%) | |
| University channels/ professional organisations/non-profit physician/physician groups | 10 (58,8%) | 22 (57.9%) | 80 (65%) | |
| Stand-alone health information websites | - | - | - | |
| Medical advertisements/for profit companies | - | - | - | |
| Individual | - | 2 (5.3%) | 3 (2.4%) | |
| Speaker, n (%) | | | | 0,045 |
| Physician | 11 (64.7%) | 17 (45.9%) | 75 (61%) | |
| Non-physician health provider | 2 (11.8%) | 5 (13.5%) | 16 (13%) | |
| Individual in the video | 0 | 9 (24.3%) | 8 (6.5%) | |
| External voice | 4 (23.5%) | 5 (13.5%) | 24 (19.5%) | |
| Target audience, n (%) | | | | 0,07 |
| Male | 0 | 4 (10.8%) | 14 (11.3%) | |
| Female | 2 (11.9%) | 11 (29.7%) | 16 (12.9%) | |
| Both gender | 15 (88.2%) | 22 (59.5%) | 94 (75.8%) | |

Values of p <0.05 was accepted as significant and marked bold, N: Number of patients, GQS: Global quality scale.
*median **mean ± standard deviation.

Mean GQS score was 3.94±1.39 group A, 1.84±0.59 group B and 3.13±0.94 group C (p<0.001). Mean reliability values were 4.18±1.13group A, 1.66±0.66 group B and 3.03±0.87 group C (p<0.001). Comprehensiveness scores were 6.94±2.49 group A, 1.53±0.95 group B and 4.87±1.72 group C (p<0.001). Inter-group comparisons were also done (Table 3).

**Table-3:** Pairwise comparison of videos with respect to usefulness..

| | P value | | |
|---|---|---|---|
| | Group 1-2 | Group 1-3 | Group 2-3 |
| Video length (min) | N/S | N/S | 0.039 |
| Number of views | N/S | N/S | N/S |
| Duration, month | N/S | N/S | N/S |
| Likes | N/S | N/S | N/S |
| Dislikes | N/S | N/S | N/S |
| Comments | N/S | N/S | N/S |
| Reliability score | <0.001 | <0.001 | <0.001 |
| Comprehensiveness score | <0.001 | <0.001 | <0.001 |
| GQS score | <0.001 | <0.001 | <0.001 |

Values of p <0.05 was accepted as significant and marked bold
GQS: Global quality scale.

## Discussion

The current descriptive study evaluated the quality and reliability of videos on YouTube to increase awareness about HPV vaccination. Despite the information shared and frequently updated by major health organisations related to the HPV vaccine, it was found that the information on YouTube, which patients can easily access, was not sufficient. Although high quality useful information was available, the rate of misleading and insufficient information was much higher.

It is very important in today's era to make available accurate information on the internet, which is the most frequently used platform accessed for information by people around the world. Approximately 59.6% of the global population are using the internet every day[18]. Being one of the most popular media-sharing sites on the internet and an important dynamic of digital marketing, YouTube has become increasingly popular in sharing information about health for healthcare professionals and patients. Data from the 2018 Health Information National Trends Survey showed that over a third of patients watch health-related videos on YouTube[19]. On YouTube, which can be used as a source of health-related information, professional opinions, personal healing experiences and medical innovations can be shared. The use of the YouTube for medical purposes can increase the awareness of people about their diseases

and improve their health condition. However, it can also have negative consequences, such as the loss of private health information and the potential harm caused by the spread of inappropriate or misleading information since there is no control system evaluating the accuracy and reliability of the information shared on the internet.

YouTube, where 500 hours of video are uploaded every minute worldwide, has 30 million active users per day[20]. In the current study, a total of 9 million views comprising over 17 hours of viewing time, about 64 million likes, 1 billion dislikes and 7,845 comments were followed. Although videos about HPV vaccination on YouTube are popular, the number of useful videos 17(9.5%) was lower than mis-leading 38(21.2%) and insufficient 124(69.3%) videos. In this study, as in other studies using similar methodology, comprehensiveness, reliability and GQS were found to be significantly higher than the other groups in the useful information group[20-22]. Kocyigit et al.[21] found 53(34%), Rittberg et al.[22] 51(19.6%) and Esen et al.[23] 87(37.9%) videos that had useful information. Many studies investigating the quality of the videos on YouTube have found that high-quality information content is often created by university channels, professional organisations, non-profit physicians and physician groups[21,22,24]. When the current study evaluated the videos in terms of uploading sources, surprisingly there was no significant difference among the groups. The results are comparable with earlier studies[25,26]. Radonjic et al. reported that the training videos uploaded by non-physicians were significantly more popular[26]. Further, Adhikari et al. reported that the most popular videos were based on personal experiences, although most of the videos were uploaded by professional associations in the shape of news reports and lessons[24].

In the current study, 179 videos related to cervical cancer were analysed and the quality of the videos discussing different aspects of cervical cancer was inadequate, and the least uploaded videos were personal videos, and no personal video fell under the useful information category. Personal videos mostly included the experiences of patients with cervical cancer and irrelevant side effects of the HPV vaccines. The rate of personal videos compared to other studies was found to be quite low[21,23,27]. This may be because patients do not want to use their personal information about their illness. Although the proportion of videos created by reliable sources was high, the low proportion of videos containing useful information may be due to several factors, such as the sample size which is larger compared to other studies and HPV vaccine and instructions that are updated frequently[8-10].

In the analysis of audience interaction parameters, the study found that there was no difference among the groups in terms of total views, daily views, duration of videos, likes, dislikes and comments. Although there was no significant difference, the number of daily views in the useful information group was higher than the other groups. Although some studies[24,27] have significant differences in terms of video quality with these parameters, most studies are similar to the current results. Esen et al.[26] and Kocyigit et al.[24] reported similar results in this domain. Esen et al. also found that the number of daily views was higher in the misleading information group[26]. Ku et al.[22] assessed the quality of YouTube videos on male infertility and found that the total number of days, likes and dislikes, and total views did not correlate with video quality. Therefore, internet users should take these parameters less into account when evaluating videos on YouTube. When the groups were compared in terms of video length, there was a significant difference. Especially useful information videos were longer, and in the binary comparison, the insufficient information group was longer than the misleading information group (Table 3).

The World Health Organisation (WHO) recommended HPV vaccination in 2009 to prevent cervical cancer cases[28]. HPV virus is a sexually-transmitted infection agent that can cause life-threatening cancers in older ages in both genders. Several studies have shown that vaccination in both men and women is more effective at reducing HPV infection[29]. The overall burden of HPV-related cancers and pre-cancerous lesions among men is less than that of cervical cancer in women. How-ever, the overall benefit of vaccinating men outweighs potential risks due to the added population benefits resulting from herd immunity and documented safety of HPV vaccines[29]. Therefore, it is important to recommend HPV vaccine for both genders. In the current study, HPV vaccine recommendation rates in both genders were found to be 88.2% in the useful information group, 75.8% in the inadequate information group and 59.5% in the misleading information group.

The WHO / United Nations Children's Fund (UNICEF) has confirmed that vaccine hesitation in many parts of the world has increased annually between 2014 and 2016[30]. Since vaccine instability remains a global problem, some content against HPV vaccination was also noted in the current study. The concerns about HPV vaccine have shown that it can lead to sexual activity among children, or that it is unnecessary or not safe[31]. Therefore, healthcare providers should communicate the effectiveness and importance of HPV vaccine with more

accurate information.

The current study has its limitations. Given that YouTube is constantly evolving, selecting the top 200 videos at the same time may not accurately reflect what the users view in real. Also, since only English videos were analysed, the results may not represent the entire audience. Moreover, there is no way to determine the demographic characteristics of the audience in the analysis. Finally, a cached browser was used to eliminate the impact of web history on results before searching, but YouTube's 'relevance' function can change search results.

## Conclusion

While YouTube has the potential to provide easy and often free access to data, it is vulnerable to unreliable information getting uploaded on the platform. Although there is a lot of evidence of the benefits of immunisation, prejudices against all kinds of vaccinations have been increasing in recent years. With respect to HPV vaccination, YouTube can provide useful information as well as largely misleading and insufficient information. Professional organisations, university channels and doctors should provide accurate, unbiased and evidence-based information to raise community awareness through informative and educational videos to YouTube.

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