YOUTUBE AS A SOURCE OF INFORMATION ABOUT CORONAVIRUS DISEASE 2019 VACCINE

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Abstract
Introduction: YouTube is a very important source of information. The videos in YouTube provide a message with information. The purpose of this article was to assess the main message of available materials about coronavirus disease 2019 (COVID-19) vaccines on YouTube. Methods: In this study, the four search terms "COVID-19 vaccine", "COVID-19 vaccination", "Coronavirus vaccine", "Coronavirus vaccination" were scanned on the YouTube (www.youtube.com) media platform on 9 February 2021. We examined video parameters i.e., durations, view counts, likes, dislikes, comments, messages and sources of the 83 videos about COVID-19 vaccine. Results: The messages were defined as 52 (62.6%) positive, 12 (14.5%) negative, and 17 (20.5%) ambiguous about getting vaccinated. Significant differences were determined between the message category groups in respect of the like ratio (p = 0.014). Positive group videos were less liked. Conclusion: More negative messages about the COVID-19 vaccine were found in media-sourced videos. Negative and ambiguous videos were more attractive to YouTube users. Scientists, policymakers, and community leaders should play a role in disseminating information about COVID-19 vaccine and vaccination.

Keywords: YouTube, COVID-19, vaccine, coronavirus, vaccination

INTRODUCTION
Coronavirus Disease 2019 (COVID-19) first appeared in China in December 2019 [1]. With the rapid spread of this respiratory disease, it was declared a global epidemic by the World Health Organisation (WHO) on March 11, 2020 [2]. COVID-19 has continued to spread, and as of February 2021, has caused over 100 million confirmed cases and over 2 million deaths [3].

Herd immunity is required for the control of COVID-19, and vaccination is vital for immunization [4, 5]. Numerous new vaccines have been produced [6], and the approval process for COVID-19 vaccines has been accelerated. The rapid introduction of vaccines has caused hesitation in the public, especially those who obtain vaccine information from the media [7]. This lack of trust in COVID-19 vaccines is the result of false information on media platforms [8]. As the pandemic continues, it is essential for disease prevention and control that accurate information can be accessed by the public [9]. The internet is an increasingly common source of health information for individuals and YouTube can be used as an important educational tool during a pandemic [10].

YouTube is a considerable source of health-related information since it provides broad material and free videos to a wide number of consumers and allows individuals to reach health-related information. At this point, the reliability and quality of the video content are critical considerations. There are worries concerning YouTube users’ access to appropriate and accurate information [11]. YouTube provides both high-quality educational and misleading-incorrect content [12]. The aim of this study was to evaluate the main message information about COVID-19 vaccines on YouTube.

MATERIAL AND METHODS
In this content analysis study, the four search terms of "COVID-19 vaccine, COVID-19 vaccination, Coronavirus vaccine, Coronavirus vaccination" were scanned on the YouTube (www.youtube.com) media platform on 9 February 2021. Filtering was applied according to the 'views count' after the deletion of the browsing history and cookies. As a result, a total of 240 videos, as 60 videos from each search term, were saved as files and these videos were reviewed independently by two of the authors. Following the exclusion of 141 duplicate videos, 8 which were not in English videos, and 8 which were off-topic videos, a total of 83 videos were included in the study for analysis. The length of the video, the number of views, the upload date, the comments, and the number of likes and dislikes were recorded for each video. The comments per day and views per day of the videos were calculated according to the total number of days since the video had been uploaded to YouTube.

VIDEO SOURCES
The video sources were categorized into 6 groups as physician, health-related organization, independent users, news/media, vaccine company, and government.

MAIN MESSAGE CATEGORY
The message was classified into four main categories, similar to those used in previous studies [13]. If the video supported vaccination, encouraged vaccination, stated that it is safe, and presented it as a social requirement, the main message was defined as positive. If the video advocated against vaccination, emphasized the risk of immunization and side effects, emphasized conspiracy allegations or manufacturer's profit, the main message was defined as negative. If the video stated that vaccination is socially good but has negative experiences, the main message was defined as ambiguous, and if the video did not contain messages, it was defined as none.

DATA ANALYSIS
Two authors (EK and HÜ) searched and then independently reviewed the videos. In case of disagreement, the authors came together and reached the final decision by consensus. Cohen's kappa coefficient was used for inter-rater reliability. The kappa coefficient of agreement regarding the main message classification of these videos was 0.89. The Kolmogorov-Smirnov test was used to determine if the variables conformed to a normal distribution, then differences between more than two categorical variables were determined with the Kruskal Wallis test. Data were analyzed using SPSS vn.15 software (SPSS, Chicago, IL, USA). A value of p <0.05 was considered statistically significant.

ETHICS
Ethics Committee approval was not required for this study as YouTube is accessible to the general public. Ethical approval was not required in similar studies [14, 15].

RESULTS
Of the 240 videos screened, 83 met the study inclusion criteria and were evaluated. The median (minimum-maximum) values recorded for the descriptive statistics were, duration: 407 sec. (36-4690), view count: 1216459 (331506-9727581), comments: 4607.5 (68-31325), likes: 16579 (10-96289), and dislikes: 2031 (6-31554) (Table 1).
The source of the videos was most commonly news/media (n=45), followed by independent users (n=18) and physicians (n=10). The quality and main message classifications of the videos according to the sources are shown in Table 2.

No significant differences were determined between the positive, negative, and ambiguous message groups in respect of the number of views per day, and comments per day (p > 0.05). Significant differences were determined between the message category groups in respect of the like ratio (p = 0.014) (Table 3).

DISCUSSION
The development of a vaccine is a complex process, which involves multiple stages progressing through pre-clinical stages, clinical development, regulatory review and approval, mass production, and finally, quality control. In the context of a COVID-19 vaccine, a thorough explanation of this procedure and the associated economic, social, and technical issues has been defined elsewhere [16, 17]. Some segments of society are highly resistant to vaccines, and there is a considerable anti-vaccine presence on widely used social media platforms such as Facebook and Instagram [18, 19]. The finding was that only approximately 62% of the videos presented a positive message. There is an obvious requirement to identify the importance of health literacy in minimizing COVID-19 transmission and to increase comprehension of the material readily available on social media, which may affect the acceptance of COVID-19 vaccination.

Most of the videos were uploaded by independent users and media companies. In a similar study before any vaccines were produced, the majority of videos and cumulative views (73 of 100 videos) were provided by news resources, while only 11% were sourced from professionals [20]. In our study, physicians were the source of 10 of the 83 videos we reviewed. Moreover, in 9 of these 10 videos, the main message was positive. In the videos, we found that doctors are highly advocates for the COVID-19 vaccine. While there are studies reporting that healthcare professionals are highly supportive of vaccines, in some cases physicians need additional evaluation for their extremely fragile patients [21, 22]. Society can be easily manipulated by uncertain sources or by people who are not specialists in the subject. Unscientific news can often be presented in media outlets around the world. However, on platforms with unlimited content such as YouTube, this possibility poses a danger as it can be obtained more easily. One of the main problems is that there is no filtering of content, so viewers cannot be warned that they contain incorrect or incomplete information. Since the beginning of the pandemic, many myths and conspiracy theories about this disease have come into wide circulation [23]. Whereas doctors, health-related organizations, the vaccine company, and the government give positive messages about the COVID-19 vaccine, independent users and the media give negative or ambiguous messages in the videos.

Statistics show that 95 percent of global Internet consumers views YouTube [24]. As a result, the current study's findings can be generalizable, and the strategy can be utilized as a model for future investigations in other languages.

This study had some limitations, the most significant of which was that it only reflects a snapshot in time. This is particularly substantial because YouTube uploads and their associated view counts fluctuate on a daily basis. The total views for each video were documented and the cumulative views of videos uploaded by different sources and addressing various content. In addition, the search date is not very up-to-date as it is a snapshot of February 2021 data. Finally, only two reviewers were involved, thus the reproducibility of the results may be limited.

CONCLUSIONS
The videos mainly came from news and media sources. Negative messages were delivered in significant numbers in these media-sourced videos. Although there were fewer video sources, doctors were still sending out positive messages. Furthermore, videos with positive messages were less liked by users. According to our findings, negative and ambiguous videos for the COVID-19 vaccine are more appealing to YouTube users. Based on these findings, physicians, policymakers and community leaders should play a role in the quality production of such video content about COVID-19 and vaccination, and these people should also play a role in preventing the broadcasting of misinformation to the community.

AUTHOR CONTRIBUTIONS
All authors substantively contributed to the drafting of the initial and revised versions of this review. They take full responsibility for the integrity of all aspects of the work.

CONFLICTS OF INTERESTS
All authors have completed the ICMJE Disclosure Form (http://www.icmje.org/disclosure-of-interest/). Both authors declare that there are no potential conflicts of interest.
References


Table 1. Parameters of the videos

<table>
<thead>
<tr>
<th>Video parameters</th>
<th>Median (min-max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (seconds)</td>
<td>407 (36-4690)</td>
</tr>
<tr>
<td>View count</td>
<td>1216459 (331506-9727581)</td>
</tr>
<tr>
<td>Number of comments</td>
<td>4607,5 (68-31325)</td>
</tr>
<tr>
<td>Number of likes</td>
<td>16579 (10-96289)</td>
</tr>
<tr>
<td>Number of dislikes</td>
<td>2031 (6-31554)</td>
</tr>
</tbody>
</table>

Table 2. Main message categorization of the videos according to sources, (n)

<table>
<thead>
<tr>
<th>Source</th>
<th>Positive</th>
<th>Negative</th>
<th>Ambiguous</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>9</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Health-related organization</td>
<td>4</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Independent users</td>
<td>8</td>
<td>-</td>
<td>9</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>News/media</td>
<td>26</td>
<td>12</td>
<td>6</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>Vaccine company</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Government</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>12</td>
<td>17</td>
<td>2</td>
<td>83</td>
</tr>
</tbody>
</table>

Table 3. Views per day, comments per day and the like ratio of videos according to the main message

<table>
<thead>
<tr>
<th>Message</th>
<th>Views per day&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Comments per day&lt;sup&gt;b&lt;/sup&gt;</th>
<th>*Like ratio&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median (min-max)</td>
<td>Median (min-max)</td>
<td>Median (min-max)</td>
</tr>
<tr>
<td>Positive</td>
<td>13267(2270-289750)</td>
<td>30.26 (1-939)</td>
<td>0.80 (0.22-0.98)</td>
</tr>
<tr>
<td>Negative</td>
<td>21431(3770-59351)</td>
<td>69.71 (23-399)</td>
<td>0.92 (0.37-0.95)</td>
</tr>
<tr>
<td>Ambiguous</td>
<td>14769(7034-86448)</td>
<td>57.70 (15-497)</td>
<td>0.96 (0.63-0.98)</td>
</tr>
</tbody>
</table>

<sup>a</sup>p=0.260, <sup>b</sup>p=0.249, <sup>c</sup>p=0.014

*Like ratio: like/like+dislike
Цитирование: Гайдаев, З., Прокопчук, В. Вакцинация против коронавирусной инфекции в условиях глобальной пандемии. Медицинский журнал, 2021, № 4, с. 57-61.

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