

# Are YouTube Videos Useful for Patients Interested in Botulinum Toxin for Bruxism?

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**Purpose:** The study purpose was to evaluate the quality of provided information from YouTube videos (Google LLC, San Bruno, California) related to botulinum toxin injections for bruxism treatment.

**Materials and Methods:** In this cross-sectional study, a search of YouTube videos was conducted using the search term “Botox/bruxism.” The first 150 videos were initially screened. After exclusions, the remaining 97 videos were independently examined by 3 researchers regarding demographic data and the content’s usefulness. All videos were classified according to a usefulness score as poor, moderate, or excellent by evaluating content quality and flow. General video assessment included duration, views, “likes,” “dislikes,” and comments. Video content was analyzed by an 8-point score list. All videos were classified based on sources (universities and hospitals, health care professionals, health companies, individual users, or others) and types (patient’s experience, educational, or scientifically erroneous or unproven information). The obtained data were analyzed according to the usefulness score. For statistical analysis, the  $\chi^2$  test, Kruskal-Wallis test, and Pearson test were performed. Interobserver agreement was calculated as the  $\kappa$  score.

**Results:** The usefulness scores of the included videos ranged from poor (0) to excellent (2) (mean, 0.65). When video demographic data were compared with the usefulness score, the durations of excellent and moderate videos were statistically significantly longer than those of poor videos ( $P = .022$  and  $P < .05$ , respectively). However, no statistically significant differences were found between the usefulness score and the number of views, likes, dislikes, and comments ( $P > .05$ ). A statistically significant relationship was found between video demographic data and the source of upload ( $P < .05$ ). The videos uploaded by individual users were longer than the other videos and had higher numbers of likes, dislikes, and comments than the other videos ( $P < .05$ ). No significant correlation was found between video usefulness and the source of upload ( $P = .697$ ) or type of video ( $P = .228$ ).

**Conclusions:** Health care professionals should assess YouTube videos related to Botox (Botox, Allergan, Inc, Irvine, California) and bruxism for clinical accuracy and content quality and recommend to patients those videos that meet professionals’ standards and achieve the intended educational goals.

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Botulinum toxin (Botox), produced by the anaerobic bacterium *Clostridium botulinum*, is a potent biological exotoxin that blocks acetylcholine release from the cholinergic nerve endings of the neuromuscular

junction.<sup>1</sup> The US Food and Drug Administration has approved the use of botulinum toxin types A (BTX-A) and B (BTX-B). BTX-A has been shown to be effective for cosmetic purposes and noncosmetic medical

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conditions such as temporomandibular disorders, bruxism, hemifacial spasm, masticatory myalgia, and headache.<sup>2</sup>

Bruxism is defined as nonfunctional maxillomandibular activity characterized by grinding and clenching of the teeth.<sup>3</sup> Overloading of muscles due to tooth clenching and grinding can lead to wear on teeth; pain in the head, neck, jaw, teeth, and temporomandibular joint; tooth loss caused by periodontal disease; failure of dental restoration; esthetic problems; and so on.<sup>4,5</sup> Many theories have been discussed to explain the etiologic factors of bruxism, including stress, malnutrition, allergic and endocrinologic diseases, central nervous system disorders, genetic factors, medicines, malocclusion, and incorrect dental treatment, but the explanation remains unclear.<sup>6,7</sup> The etiology of bruxism is considered multifactorial. Therefore, its treatment should be approached from a multifactorial aspect. The main goal of bruxism treatment is to reduce the detrimental effects of bruxism, such as wear of tooth surfaces, grinding and clenching of the teeth, facial and temporal pain, and masseter hypertrophy, on biological structures.<sup>8,9</sup> In recent years, the use of Botox for the management of bruxism has become popular. Botox injections are applied into the masseter and temporalis muscles to reduce masseter hypertrophy and relax these muscles. The potential effect of BTX-A on bruxism is still controversial.<sup>5,8,10</sup>

Information about Botox injections for bruxism is available from different resources including physicians, dental practitioners, and health companies. Many patients search the Internet for various types of health care information including information on Botox injections. Traditionally, information related to Botox injections for bruxism treatment is widely available to the public from health care professionals and organizations, academic institutions, and dental practitioners. However, more patients are using the Internet to find medical information and treatment methods for their illnesses because the Internet provides great accessibility about every subject. YouTube (-Google LLC, San Bruno, California), Google (-Mountain View, California), and Facebook (Facebook, Menlo Park, CA) are popular websites on which patients can learn more information about Botox injections for bruxism. The utility and educational value of YouTube videos in dentistry have been underestimated.<sup>11</sup> Several studies have evaluated YouTube videos for patient education and health promotion.<sup>12-16</sup> However, only a few studies have evaluated YouTube videos on oral health-related diseases.<sup>17-22</sup>

To our knowledge, no studies have analyzed the utility and effectiveness of YouTube videos on botulinum toxin injections for the treatment of bruxism. The specific aim of this study was to evaluate the content of

YouTube videos regarding the flow and quality of information they contain about Botox injections for bruxism treatment.

## Materials and Methods

### STUDY DESIGN AND SAMPLE

To address the research purpose, we designed and implemented a cross-sectional study. The study population was composed of all YouTube videos containing information about botulinum toxin injections for bruxism treatment available on November 15, 2018, between 9 AM and 6 PM. The following search topic was used: "Botox/bruxism." We used "sort by relevance" as the default filter for YouTube searches. It has been shown that most of YouTube users search the first 60-200 videos, and the majority of the Youtube users usually scan only the first 30 videos.<sup>23,24</sup> In our study, the first 150 videos appearing for the search term "Botox/bruxism" were viewed and analyzed. Initial screening of videos was performed to exclude videos in languages other than English, duplicate videos, videos with no sound or heading, videos about other diseases for which Botox injections were applied, videos about other treatment methods for bruxism, advertisements (eg, promotion of oral health product or dental clinic), irrelevant videos, and conferences or lectures (videos primarily directed at a specialized audience). Only English-language videos, videos that had acceptable video quality, and videos that included primary content related to Botox injections for bruxism treatment were included in this study.

### VARIABLES

For each video, we recorded the number of views; total video duration; total numbers of comments, "likes," and "dislikes"; date of upload; and country of origin. Viewers' interactions were calculated based on the interaction index ( $[\text{Number of likes} - \text{Number of dislikes}] / \text{Total number of views} \times 100\%$ ) and the viewing rate ( $\text{Number of views} / \text{Number of days since upload} \times 100\%$ ).

For each video, we recorded the source of upload, categorized as universities and hospitals, health care professionals (general dentists, oral-maxillofacial surgeons, and dermatologists), health companies and information websites, individual users, and others (TV channels, news agencies, and so on). In addition, we categorized the type of video as patient's experience (testimonial videos reporting a personal experience about Botox injections for bruxism treatment, with potential use of this information to help patients decide whether the Botox procedure is right for them), educational (videos that aimed to raise

awareness about botulinum toxin injections for bruxism treatment), and scientifically erroneous or unproven information.

We evaluated videos for the presence of content in 8 non-mutually exclusive domains of information related to Botox and bruxism. Videos were rated for the presence of content in the following areas: definition, indications, contraindications, advantages, procedures involved, complications, cost, and prognosis and survival (Table 1).<sup>22</sup>

#### DATA ANALYSES

All 3 researchers (S.G., Ö.Ö.Z., and A.P.B.) viewed and analyzed the videos independently. All reviewers were blinded to each other's responses. The researchers did not see the numbers of likes, dislikes, or comments before completing their reviews for objective assessment.

Each area of content was given 1 point, for a total possible score of 8 points. A score of 0 to 2 points indicated poor video content that contained missing information and was not at all useful for patients. A score of 3 to 5 points indicated moderate video content that conveyed a positive message about botulinum toxin injections but poorly discussed some information topics. A score of 6 to 8 points indicated excellent video content that conveyed comprehensive and accurate information to patients.

In addition, a usefulness score was recorded for all videos: poor, moderate, or excellent (Table 2).<sup>25</sup> We determined the usefulness score by assessing the content score, quality, and flow of the video. A poor score

**Table 1. TOPIC DOMAINS OF EVALUATED YOUTUBE VIDEOS RELATED TO BOTOX AND BRUXISM**

	Score, Points
Scoring item	
Definition	1
Indications	1
Contraindications	1
Advantages	1
Procedures involved	1
Complications	1
Cost	1
Prognosis and survival	1
Total score	8

*Note:* For each topic, a 1-point score was used, for a total of 8 possible points. A score of 0 to 2 points indicates poor video content (not at all useful for patients); 3 to 5 points, moderate video content (some topics were discussed but others were poorly mentioned, somewhat useful for patients); and 6 to 8 points, excellent video content (very useful for patients).

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**Table 2. VIDEO USEFULNESS SCORING**

Score	Definition
Poor	Poor quality and poor flow of video, some information is listed but most is missing, not at all useful for patients
Moderate	Moderate quality and suboptimal flow of video, some important topics are discussed but others are poorly mentioned, somewhat useful for patients
Excellent	Excellent quality and flow of video, excellent and accurate information is mentioned, very useful for patients

*Note:* For each video, the video usefulness score was calculated from scores for each topic domain discussed in the video and assessment of the accuracy and quality of the video.

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was assigned if the video was of poor quality and had poor flow, some information was mentioned but most was missing, and the video was not useful for patients. A moderate score was assigned if the video was of moderate quality and had suboptimal flow, some important information was mentioned but other information was poorly discussed, and the video was somewhat useful for patients. In contrast, an excellent video contained excellent quality and flow, included most of the relevant information, and was very useful for patients.

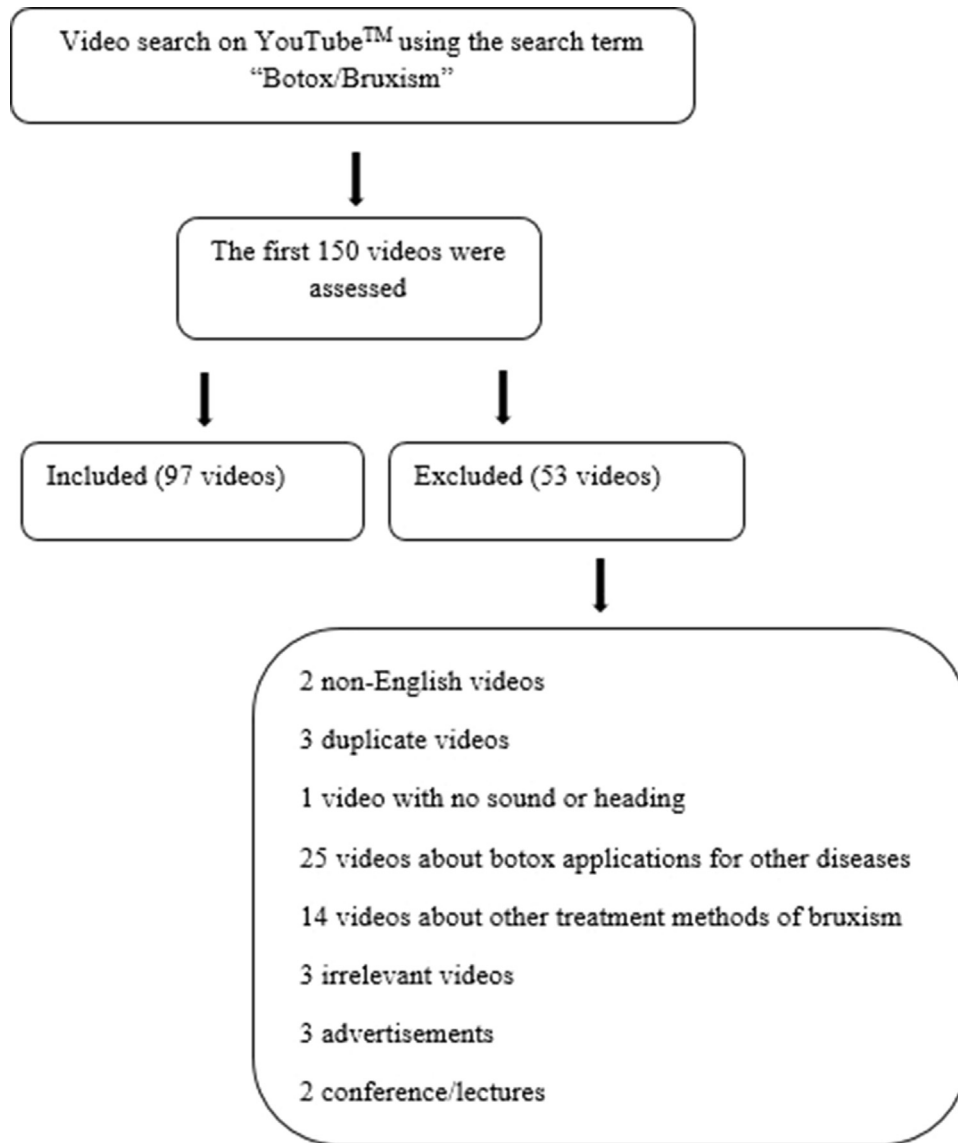
Disagreements between researchers regarding categorization or scoring of a particular video were resolved by searching the literature and discussing the issue until a consensus was reached. The study was deemed exempt by the Faculty of Dentistry Research and Ethics Committee.

#### STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS Statistical Software (version 21; IBM, Armonk, NY). Interobserver agreement was calculated as the  $\kappa$  score. Continuous variables were analyzed using analysis of variance and the Kruskal-Wallis test, and categorical variables were analyzed using the  $\chi^2$  test. Correlations were determined using the Pearson test. Statistical significance was set at  $P < .05$ .

## Results

The first 150 videos were screened for relevance based on our inclusion criteria. After initial screening, 53 videos were excluded (Fig 1). The remaining 97 videos were analyzed in this study. Videos were classified based on source. More than half of the videos (69.1%,  $n = 67$ ) were uploaded by health care



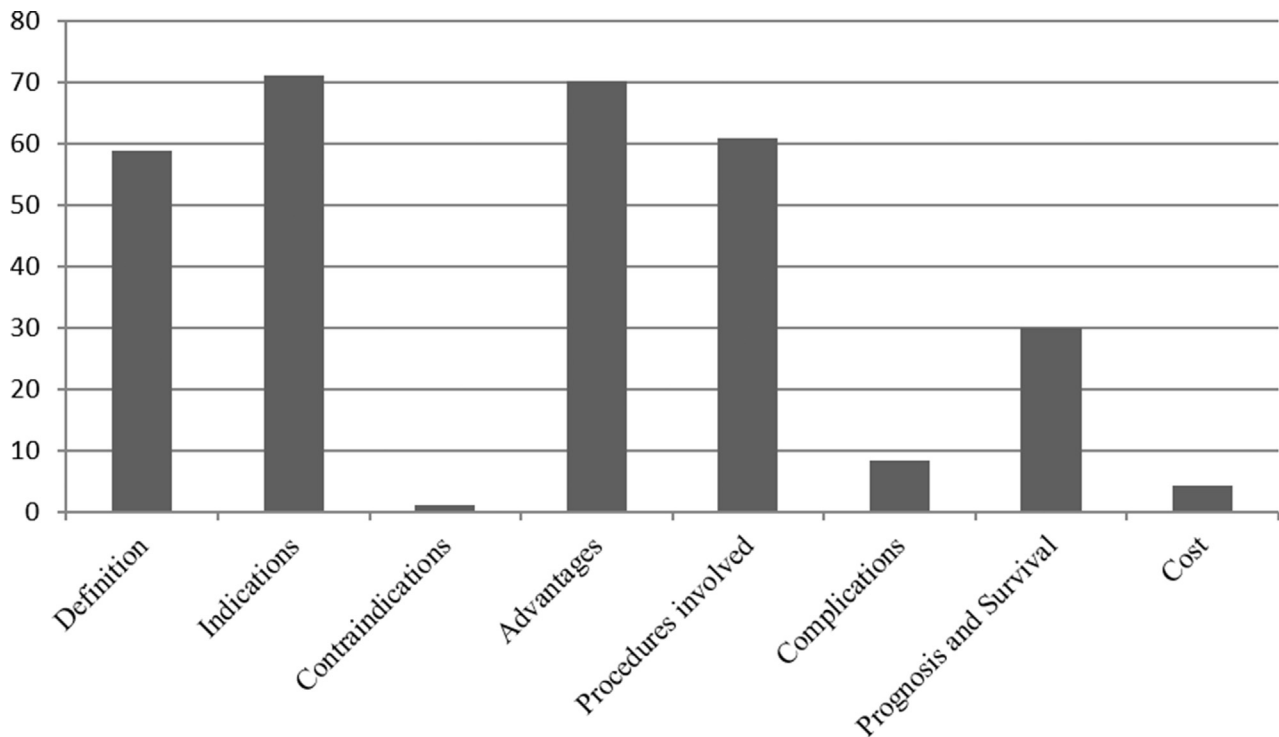
**FIGURE 1.** YouTube video selection for analysis.

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professionals (general dentists, oral-maxillofacial surgeons, and dermatologists), whereas 15.4% ( $n = 15$ ) were uploaded by individual users, 3% ( $n = 3$ ) were uploaded by health companies and information websites, and 12.4% ( $n = 12$ ) were uploaded by others. Videos also were categorized according to type: patient's experience ( $n = 21$ ), educational ( $n = 74$ ), or scientifically erroneous or unproven information ( $n = 2$ ). The mean length of the videos was 3 minutes 23 seconds (range, 9 seconds to 15 minutes 28 seconds). The mean number of views of videos on Botox and bruxism was 10,219 (range, 10 to 276,602). Viewers' interaction with videos was generally positive; the mean interaction index score was 5.74% (range, 0.00 to 98.25532%).

In this study, most videos (65%,  $n = 63$ ) were uploaded by users in the United States; 21% ( $n = 20$ ) were uploaded by users in other countries (Canada, New Zealand, Austria, Scotland, United Kingdom). For 14 videos, the source was not specified.

The usefulness scores of the included videos ranged from poor (0) to excellent (2) (mean, 0.65) according to quality and flow of the videos and the presence of content in 8 non-mutually exclusive domains. The YouTube videos contained variable information on Botox injections for bruxism patients (Fig 2). Indications (71.13%,  $n = 69$ ), advantages (70.10%,  $n = 68$ ), and procedures of Botox for bruxism treatment (60.82%,  $n = 59$ ) were the most discussed topics, whereas contraindications (1.03%,  $n = 1$ ), cost (4.12%,  $n = 4$ ), and



**FIGURE 2.** YouTube video content.

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complications (8.25%,  $n = 8$ ) were poorly mentioned in the evaluated videos.

On comparison of the usefulness score and video demographic data, the durations of excellent and moderate videos were statistically significantly longer than those of poor videos ( $P = .022$  and  $P < .05$ , respectively). However, no statistically significant differences were found between the number of views, number of likes, and number of dislikes and the usefulness score ( $P > .05$ ). Descriptive statistics of the video demographic data according to the usefulness score and the relationship between them are shown in Table 3. No significant relationship was found between video usefulness and the viewing rate ( $P = .061$ ). In addition, no statistically significant difference was found between video usefulness and the interaction index ( $P = .287$ ). Even though no statistically significant correlation was found between the interaction index

and usefulness score ( $P > .05$ ) or number of comments ( $P > .05$ ), the Pearson correlation test showed a significant difference between the interaction index and viewing rate ( $P < .05$ ). No statistically significant difference was found between video usefulness and the type of video ( $P = .228$ ). Of the patient's experience videos, 48% were deemed moderately useful and 52% were deemed poor. Of the educational videos, 33.78% were classified as poor whereas 60.81% were classified as moderately useful and 5.4% of the educational videos were found excellent. Only 2 videos were deemed scientifically erroneous and included unproven information. A statistically significant correlation was found between the number of views, number of likes, and number of comments and the type of video ( $P < .05$ ). Compared with educational and scientifically erroneous videos, patient's experience videos had higher mean numbers of views

**Table 3. YOUTUBE VIDEO DESCRIPTIVE DEMOGRAPHIC DATA ACCORDING TO USEFULNESS SCORE**

	Poor (n = 38)	Moderate (n = 55)	Excellent (n = 4)	P Value
Duration	3 minutes 3 seconds	3 minutes 35 seconds	3 minutes 33 seconds	.022
Views	3,226.6316	14,670.6000	15,455.7500	.082
Likes	192.2632	49.7636	146.2500	.576
Dislikes	7.1316	6.8909	4.5000	.493
Comments	15.6579	9.2364	12.2500	.153

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( $n = 21$ ; mean rank, 54.88) and comments (mean rank, 61.31).

No statistically significant difference was found between the interaction index and the source of upload ( $P = .339$ ), that is, health care professionals (mean rank, 46.66;  $n = 67$ ), health companies and information websites (mean rank, 43.00;  $n = 3$ ), individual users (mean rank, 61.07;  $n = 15$ ), and others (mean rank, 48.50;  $n = 12$ ). In addition, no statistically significant difference was found between video usefulness and the source of upload ( $P = .697$ ). The sources of upload of the videos according to the usefulness score are shown in Table 4. Although no significant correlation was found between the viewing rate and source of upload ( $P = .70$ ), a significant difference was found between the video length and source of upload ( $P < .05$ ). The videos uploaded by individual users were longer than the other videos, and their numbers of likes, dislikes, and comments were significantly higher than those of the other videos. Video demographic data according to source-of-upload statistics are shown in Table 5. Overall interobserver agreement, calculated as the weighted  $\kappa$  score, was 0.84 (range, 0.83 to 0.87).

## Discussion

The specific aims of this study were to assess the quality of provided information and evaluate the effect of YouTube videos related to botulinum toxin injections in patients with bruxism. Patients with bruxism are increasingly seeking and receiving treatment for their pain and masseter hyperactivity with botulinum toxin, and it is interesting to note that the tendency to search for medical information using the Internet—and YouTube videos in particular—is increasing day by day. Our results showed that YouTube videos about Botox injections for bruxism treatment should be used as a reliable resource for patients.

The effects of Botox on facial esthetics are well known. In recent years, Botox has started to be used for various noncosmetic medical and surgical conditions such as laryngeal dystonia, temporomandibular

joint disorders, bruxism, headache, blepharospasm, hemifacial spasm, sialorrhea, masticatory myalgia, and cervical dystonia.<sup>26</sup> Many studies have proved the effect of Botox on bruxism treatment.<sup>5,27</sup> Guarda-Nardini et al<sup>28</sup> showed the efficacy of Botox in reducing myofascial pain symptoms in bruxism patients. Asutay et al<sup>5</sup> and Jadhao et al<sup>25</sup> found similar results to those of Guarda-Nardini et al and reported that Botox could be used safely for the treatment of bruxism. In our study, the evaluated videos had over 1 million views, with an average of 10,220 views per video. In total, the videos garnered 1,152 comments. The overall mean number of likes was 106.78 (range, 0 to 4,700), whereas the overall mean number of dislikes was 5.14 (range, 0 to 107). These statistics show that many users seek YouTube videos to learn more about Botox treatment, to share their opinions of their experiences, and to help other individuals decide whether Botox procedures will help their symptoms. Even though total content scores showed a positive correlation with descriptive video demographic data such as duration, likes, dislikes, and comments, we found that the durations of excellent and moderate videos were longer than those of poor videos. Similarly to our study, Lena and Dindaroğlu<sup>29</sup> found that high-content videos have longer durations, and they reported that people are more interested in longer videos that have more information content. Most of the included YouTube videos had moderate information content that is helpful for people interested in Botox for bruxism treatment, whereas a small number of videos had poor information content that offers insufficient information about the treatment. Our study shows the effectiveness of YouTube videos related to Botox injections for bruxism patients. It is interesting that the evaluated videos might have a positive impact on patients' health and people can obtain scientifically accurate information about Botox injections used for bruxism treatment.

YouTube contains information on various topics related to Botox treatment for cosmetic and noncosmetic conditions. Hence, people can obtain

**Table 4. SOURCE OF UPLOAD OF VIDEOS ACCORDING TO USEFULNESS SCORE**

	Poor ( $n = 38$ ), $n$ (%)	Moderate ( $n = 55$ ), $n$ (%)	Excellent ( $n = 4$ ), $n$ (%)	Total ( $N = 97$ ), $n$ (%)
Health care professionals (dentists, surgeons, dermatologists)	27 (71)	37 (67)	3 (75)	67 (69)
Health companies and health information websites	0 (0)	3 (5)	0 (0)	3 (3)
Individual users	7 (18)	8 (15)	0 (0)	15 (16)
Other	4 (11)	7 (13)	1 (25)	12 (12)

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**Table 5. COMPARISON OF VIDEO DESCRIPTIVE DEMOGRAPHIC DATA ACCORDING TO SOURCE OF UPLOAD**

	Health Care Professionals (Dentists, Surgeons, and Dermatologists) (n = 67)	Health Companies and Health Information Websites (n = 3)	Individual Users (n = 15)	Other (n = 12)	P Value
Duration	2:26	3:00	7:14	3:55	<.001
Views	6,877.4478	95,193.0000	8,721.7333	9,510.3333	.376
Likes	27.6866	316.0000	501.1333	25.6667	.011
Dislikes	3.9254	37.0000	16.0667	4.4167	.030
Comments	4.0149	31.0000	45.0667	9.5000	<.001

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information about the efficacy of Botox for bruxism treatment by searching YouTube videos. Several studies have evaluated YouTube video content for various medical aspects including oral health.<sup>15,17,18,21,22,30-32</sup> In the literature, only 1 study has assessed YouTube videos on BTX-A for wrinkles and evaluated whether YouTube is a useful resource for patient education: Wong et al<sup>33</sup> suggested that most YouTube videos related to Botox injections for wrinkles have high-quality content and may be a beneficial resource for patients. Similarly, our results showed that videos related to Botox injections to reduce bruxism symptoms should be a reliable resource for patients. Patients can benefit from discounted treatments provided that they express their positive opinions through the Internet for the purpose of advertising by clinics. This may result in uneducational and inaccurate videos. Delli et al<sup>34</sup> reported that videos related to patients' experiences contain more misleading information than other types of videos. Unlike these findings, in our study, the source of upload and type of video did not affect the quality of the provided information from YouTube videos. More than half of the videos were uploaded by qualified health care professionals, and of these videos, more than half were found to be useful and helpful for patient education. In our study, we determined the usefulness score according to topic domains as well as quality and flow of the videos. Topic domains are important to understand a video's educational effect. Although few videos discussed contraindications and complications, most videos touched on the most important topics such as indications, advantages, procedures involved, and prognosis and survival. Therefore, people could obtain accurate and useful information about Botox injections for bruxism treatment by searching YouTube videos. However, several studies have stated that the content of YouTube videos is generally poor and incomplete. So, according to these authors, YouTube should not be used as a reliable source for patients at present.<sup>16,29,35</sup> On the basis of this information, it could be emphasized that

YouTube users should review videos that have reliable origins. Health care professionals should be aware of the information available on the Internet, check the reliability of YouTube videos, and recommend accurate resources to patients. The diversity of authorship and validity of information from YouTube videos could result in useless videos that contain poor or irrelevant information. If health videos are evaluated in terms of quality and content before being uploaded to the Internet, this problem could be eliminated and people could obtain more accurate information about topics for which they are searching.

This study has several limitations. First, the results of the study may vary depending on the keyword used. When a different search term is used, different results may be encountered. Second, the results may vary depending on the date and time of the search because of the dynamic properties of YouTube. Because YouTube is a very dynamic platform, many videos are added and deleted every day. Third, during a YouTube search, videos are selected based on previous cookies and/or the cache that may be on a consumer's computer as a result of previous searches. This process will result in different lists of videos provided to each person seeking YouTube videos. Our study results suffer from the "snapshot" approach to data collection, which is a weakness that may affect interpretation of the study results. In addition, we evaluated only English-language videos directly on YouTube despite the fact that Botox is popular not only in English-speaking countries but also in developing countries where English is not necessarily the first language, thus limiting our findings.

YouTube, on which a wide variety of information about Botox injections for bruxism treatment is available, should be used as a reliable resource for educating people. Health care professionals should assess YouTube videos for clinical accuracy and quality of content to direct patients toward alternative high-quality information sources. In the future, a team of health professionals who control the quality and

information content of YouTube videos might be created that can make YouTube videos more effective and educational. The multiplication of videos with more accurate information and high information content will empower health professionals and patients to use YouTube videos more effectively.

Studies from other nations may be important as they might help us understand how different cultures might affect the content of YouTube videos and how patients from different nations are searching YouTube videos for health-related issues. Future studies are therefore encouraged to adopt a longitudinal or field-based approach to examine the usefulness of YouTube as a reliable source of information about Botox injections for bruxism treatment.

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