

# Quality of Tooth-Whitening Videos Available on YouTube

Yuanita Lely Rachmawati<sup>1</sup>, Laura Vita Catherine Naibaho<sup>2</sup>, Naufal Rifqi Aulia<sup>2</sup>

<sup>1</sup>Department of Community and Preventive Dentistry, Faculty of Dentistry, Universitas Brawijaya, Jawa Timur, Indonesia.

<sup>2</sup>Undergraduate School, Faculty of Dentistry, Universitas Brawijaya, Jawa Timur, Indonesia.

**Correspondence:** Yuanita Lely Rachmawati, Jalan Veteran, Kota Malang, Jawa Timur, Indonesia 65145. **E-mail:** [yuanita.rachmawati.fk@ub.ac.id](mailto:yuanita.rachmawati.fk@ub.ac.id)

**Academic Editor:** Catarina Ribeiro Barros de Alencar

**Received:** 17 December 2021 / **Review:** 13 March 2022 / **Accepted:** 16 April 2022

**How to cite:** Rachmawati YL, Naibaho LVC, Aulia NR. Quality of tooth-whitening videos available on youtube. *Pesqui Bras Odontopediatria Clín Integr.* 2023; 23:e210232. <https://doi.org/10.1590/pboci.2023.011>

## ABSTRACT

**Objective:** To compare how the quality of YouTube videos on tooth whitening uploaded by healthcare professionals and laypersons. **Material and Methods:** The video that was uploaded in a year was collected on YouTube using the keywords tooth whitening and dental bleaching. The exclusion criteria were duplicate videos, advertisements, no sound, too short duration, and lectures. The variables analyzed were likes/dislikes, viewers, interaction index, viewing rate, usefulness, global quality scale (GQS), and comprehensiveness score. Two observers reviewed the videos independently. Data were analyzed descriptively and analytically. **Results:** A total of 106 videos were selected, and most were uploaded by laypersons (70.8%). The observer reliability test showed excellent agreement with the intraclass correlation coefficient score minimum of 0.876. There were significant differences in dislikes ( $p=0.003$ ), views ( $p=0.016$ ), interaction index ( $p=0.010$ ), usefulness ( $p=0.030$ ), GQS ( $p<0.0001$ ), and comprehensiveness ( $p=0.014$ ) between healthcare professionals and laypersons. Videos made by laypersons had higher numbers of dislikes and viewing rates, whereas healthcare professionals were higher in usefulness, GQS, and comprehensiveness. **Conclusion:** Videos uploaded by laypersons provide low-accurate information despite being popular among viewers. Viewers need to be selective in seeking information from YouTube as a resource for oral healthcare decision-related tooth whitening.

**Keywords:** Tooth Bleaching; Social Media; Video-Audio Media; Internet.

## Introduction

Tooth whitening, which can be performed in a professional dental office or at home, is one of the most popular cosmetic dental treatments available [1]. However, surveys conducted in several countries have revealed a high rate of dissatisfaction with dental appearance and with tooth color in particular. For example, dissatisfaction with tooth color was reported by 56.2% of respondents in Malaysia [2], 67.4% in Saudi Arabia [3], 71.4% in Nigeria [4], 80.2% in Hong Kong [5], and 60.7% in Indonesia [6]. Many of the respondents to these surveys rated their knowledge of tooth whitening procedures as poor and indicated that it was based on promotional advertisements and articles in consumer magazines (44.6% of Indonesian respondents), the internet, or television commercials (50.4% and 12.7% of Hong Kong respondents, respectively) [3,5,6].

The internet is the preferred source of information for consumers seeking all types of health-related knowledge, dentistry included [7]. A 2013 study found that health-related queries accounted for 80% of all internet search activities, and most of the search results led users to YouTube. Today, YouTube is the second most visited platform after Google [8], and YouTube videos on health topics can be uploaded by laypeople and professionals alike. Health topics videos are not reviewed for content, and they are mostly unregulated [9-11]. Videos that are false or misleading can leave viewers with the wrong information and could even endanger their health [12].

A recent survey of the tooth-whitening videos available on YouTube in English shows that a majority are uploaded by laypersons (60%), and the information they provide is rated as either moderate (53%) or poor (35%) in quality [13]. Video with poor-quality content had a significantly higher number of viewing rates, and 48.5% of the poor-quality information came from videos uploaded by a layperson. The results of this study indicate that information obtained from English-language YouTube videos on tooth whitening may be largely inaccurate and should not be the basis for decision-making about tooth-whitening procedures.

The social media platform visited most frequently by Indonesians aged 16–64 years (95%) is YouTube [14], and although the content is not ranked in terms of demand, it is clearly a popular source of information on health-related topics. Many benefits are obtained from the YouTube channel, but not everyone is aware of the quality and reliability of the information they get from YouTube [15]. There are few papers related to the quality of Indonesian-language YouTube videos as a source of health information, so the necessity to explore how the quality of YouTube videos in Indonesian is needed. This study aims to assess the quality of Indonesian-language YouTube videos on tooth whitening uploaded by healthcare professionals and laypersons.

## Material and Methods

### Ethical Clearance

This research was approved by the Health Research Ethics Commission, Faculty of Medicine, Universitas Brawijaya (no. 223/EC/KEPK/07/2021).

### Data Collection

A search of Indonesian-language YouTube videos was performed using the keywords (1) tooth whitening (*memutihkan gigi*) and (2) tooth bleaching (bleaching *gigi*) (based on a review of Google trends). The video was uploaded in August 2020 – 2021. The first 100 YouTube videos that appeared in the results for each search were included in the study. The video inclusion criteria were videos identified by these keywords and created in Indonesian. The exclusion criteria were duplicate videos, advertisements, no sound, duration less than one minute and videos targeting special audiences such as conferences or lectures. Two observers conducted the

search independently. To guide the search, a manual outlining the work stages, work forms, and operational definitions of each variable was created beforehand. The variables measured were likes, dislikes, views, comments, days since upload, duration, Interaction index, viewing rate, usefulness score, global quality scale (GQS), and comprehensiveness score.

#### The Instrument Used

The interaction index and viewing rate were used to measure viewers' interactions. The interaction index was calculated as the number of likes minus the number of dislikes divided by the number of views and expressed as a percentage. The viewing rate was calculated as the number of views divided by the number of days since upload and expressed as a percentage [15]. The usefulness score, which measures the completeness and overall usefulness of the video, was based on eight criteria: definitions, indications, contraindications, benefits, procedures, complications, costs, and prognosis. Each criterion explained in the video was assigned a value of 1, and each criterion not explained was assigned a value of 0, yielding a total score ranging from 0 to 8. A score of 0–2 denotes poor video content (featuring some topics not useful to patients), a score of 3–5 denotes moderate video content (featuring a mix of topics, only some of which are useful to patients), a score of 6–8 denotes excellent video content (all topics are very useful to patients) [16].

Measures of the videos' comprehensiveness were based on observers' assessments of the completeness of the content presented in the video, which required explanations to be provided about definitions, indications, contraindications, descriptions of whitening ingredients, procedures, comparisons of ingredients, pre- and post-treatment conditions, post-treatment symptoms, and post-treatment experiences. Assessment of the completeness of content follows guidelines related to tooth whitening issued by the American Dental Association [17]. Each category of explanation was assessed and assigned a score of 1 to 4. A score of 4 was given if the topic was covered in full with no missing information; a 3 if most of the topic was covered and no important information was lacking; a 2 if sufficient information was presented on the topic and it was deemed useful despite some gaps, and a 1 if the information provided on the topic was incomplete and/or was misleading. Each video could earn a total comprehensiveness score of 9–36, and the higher the score, the more complete the content. Total scores for comprehensiveness were grouped into categories of poor (9–18), moderate (18–27), and complete (28–36) [13].

A GQS, which was developed by Bernard et al. to evaluate information presented on websites, was used by the observers to assess the quality of the tooth-whitening videos [18]. A GQS score of 1 was given to videos with poor flow, incomplete information, and a lack of useful information for patients. A GQS score of 2 indicated that some information was covered, but many important topics were not explained and the benefit of information for patients was limited. A GQS score of 3 denoted moderate quality: the flow was good, some (but not all) important information was explained, and there was little benefit for the patient. A GQS score of 4 indicated good quality: the flow was good, much of the information was relevant, although not all topics were covered, and the information was useful for the patient. A GQS score of 5 indicates very good quality: the flow was very good, all information was included, and it was considered very useful for the patient [19].

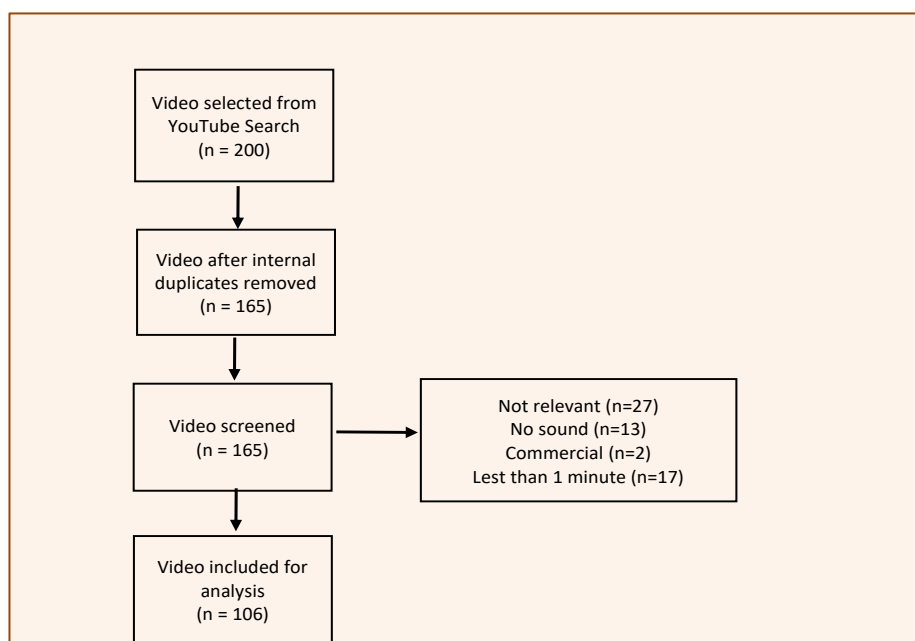
#### Data Analysis

There were two video observers in this study (LVCN and NRA). Observer reliability for all variables was measured using the intraclass correlation coefficient (ICC), a measure of the reliability of two different raters to measure subjects similarly, with the expected value limit of  $>0.8$ . In the case of a disagreement, YLR would

be the deciding party. All data collected were analyzed descriptively. The Mann–Whitney U test was carried out to compare differences in the quality of videos created by healthcare professionals versus laypersons.

## Results

Of the 200 videos downloaded from YouTube, 106 met the selection criteria and 94 were excluded due to being identified as product promotions, not relevant, no sound, duration of less than one minute or duplicated (Figure 1). A majority of the selected videos (70.8%) were uploaded by laypersons. The ICC reliability test of all variables yielded a high value of 1 and a low value of 0.876, demonstrating that the reliability of observer agreement was excellent.



**Figure 1. Flow diagram YouTube video selection for analysis.**

Statistically significant differences were found in the scores for dislikes, views, interaction index, GQS, comprehensiveness, and usefulness of videos uploaded by healthcare professionals and laypersons ( $p < 0.05$ ). The number of likes, views, days since upload, duration, and viewing rate of videos uploaded by laypersons was higher than for those uploaded by healthcare professionals (Table 1).

**Table 1. Video analysis based on uploader.**

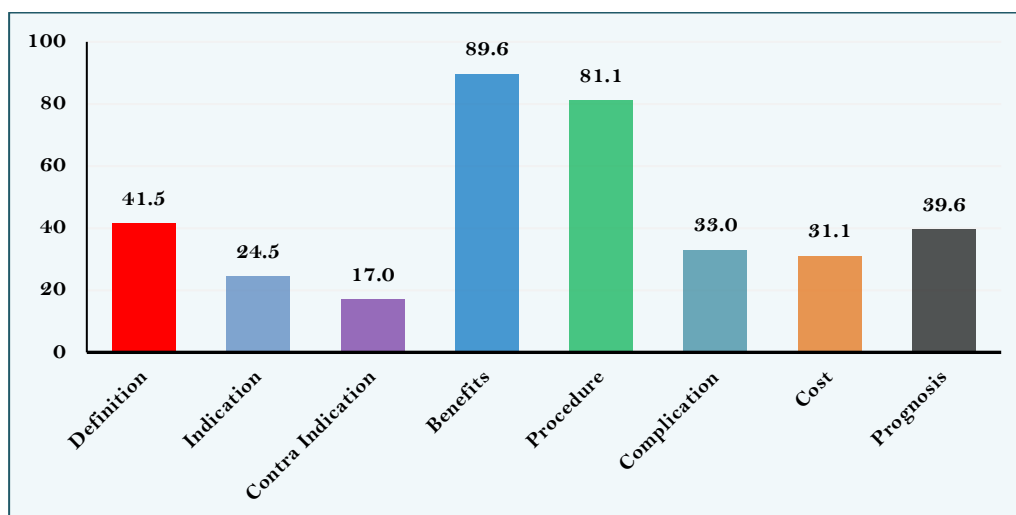
Variables	Healthcare Professional	Layperson	p-value
	Median (Min-Max)	Median (Min-Max)	
Likes	38 (0–2,447)	61 (0–10,000)	0.119
Dislikes	0 (0–71)	2 (0–169)	0.003*
Views	738 (9–130,339)	2,631 (6–167,184)	0.016*
Duration (min:s)	05:52 (01:27–35:45)	07:13 (01:42–31:43)	0.071
Days since upload	190 (7–362)	234 (21–369)	0.153
Interaction index	4.7 (0–20)	2.32 (0–25.23)	0.010*
Viewing rate	3.54 (0.03–365.12)	12.53 (0.29–1,462.63)	0.069
GQS	3 (1–5)	2 (1–4)	<0.001*
Comprehensiveness score	15 (9–29)	13 (9–22)	0.014*
Usefulness score	5 (0–7)	3 (1–6)	0.030*

\*Statistically Significant.

Table 2 shows the completeness, accuracy, and usefulness of the information reviewed in the videos. Higher scores and quality were earned by videos uploaded by healthcare professionals compared with those uploaded by laypersons. The percentages of good information quality, GQS, and usefulness were higher for videos uploaded by healthcare professionals. The reviewers found that most of the videos uploaded by laypersons focused on the benefits of and procedures for whitening teeth, and a few provided an explanation of the indications and contraindications for tooth whitening (Figure 2).

**Table 2. Quality of information provided by healthcare professionals and laypersons.**

Variables	Healthcare Professional (n = 31)		Layperson (n = 75)		Total	
	N	%	N	%	N	%
Comprehensiveness Score						
Poor Information	22	23.4	72	76.6	94	88.7
Moderate Information	5	62.5	3	37.5	8	7.5
Complete Information	4	100	0	0	4	3.8
GQS Score						
Poor	1	3.6	27	96.4	28	26.4
Low	3	8.3	33	91.7	36	34.0
Moderate	15	55.6	12	44.4	27	25.5
Generally Good	7	70	3	30	10	9.4
Exceptional	5	100	0	0	5	4.7
Usefulness						
Poor	6	18.8	26	81.3	32	30.2
Good	18	28.6	45	71.4	63	59.4
Excellent	7	63.6	4	36.4	11	10.4



**Figure 2. The percentages for criteria assessing usefulness.**

Table 3 describes, based on the quality of information, only a few videos (5%) qualified as very complete, and most of the videos provided incomplete information (60.4%).

**Table 3. Breakdown of GQS scores.**

Item Scored	N (%)
Very poor quality of information, poor flow, incomplete, no useful information for patients	28 (26.4)
Poor quality of information, poor flow, some information covered but many important topics neglected, limited benefit of information for patients	36 (34.0)

Moderate quality of information, ideal flow, some important information explained but other information neglected, little useful information for patients	27 (25.5)
Good quality of information, good flow, a lot of relevant information but some information neglected, useful information for patients	10 (9.4)
Very good quality of information, very good flow, very useful information for patients	5 (4.7)

## Discussion

Consumers make decisions based on a variety of factors, including personal experience, other people's experiences, recommendations, advertisements, and information obtained [20,21]. YouTube videos are created in large part to influence decision-making by individuals who have a large number of followers on social media and are considered trustworthy. In addition, these videos can be accessed very easily, and their content is relatively unfiltered [22].

This study evaluated the quality of Indonesian-language videos about tooth whitening and compared those uploaded by healthcare professionals to those uploaded by laypersons on a number of different parameters. Like other researchers, we found that a majority of the videos examined were uploaded by laypersons [13,23,24]. A study of English-language YouTube videos on tooth whitening reported that, according to Google Trends, the topic of teeth whitening is increasing worldwide, and definitions and application procedures are the most popular topics.

The results of our study show that only 12% of videos have good and high-quality information, videos uploaded by laypersons have a higher number of viewers, and the information presented by healthcare professionals is of better quality. Based on comprehensiveness, GQS, and usefulness scores, the percentage of videos viewed by our observers that provide complete information is small, and the quality of the information provided by healthcare professionals is better and more complete when compared with the information provided by laypersons. Our results differ from those of previous studies in the finding that the topics discussed most frequently are about benefits and procedures. In addition, a unique finding of our study is that the visibility of videos uploaded by laypersons is higher than that of videos uploaded by healthcare professionals.

Why is it so important to review the quality of video information about tooth whitening? The American Academy of Pediatric Dentistry recently established a new policy on tooth whitening for child and adolescent patients. Created for patient safety, this policy explains the indications, contraindications, procedures, ingredients, side effects, pre-post treatment, and post-treatment symptoms related to tooth whitening [25]. Unfortunately, most of the videos viewed in our study do not provide complete information. Patients who receive information provided in full by a competent person will have good literacy and will be able to make the right decision [26].

Studies of dental health-related information presented in videos on YouTube show that most content is of moderate to poor quality. Research on informational videos about oral cancer, for example, shows that most do not provide information about the importance of early detection independently or by professionals [27]. A study on root canal treatment videos shows that, in general, the information presented is incomplete [12]. Research that examined oral leukoplakia videos and assessed them based on the qualifications of the uploader found that the information provided by independent users tends to be inaccurate [24]. Studies on video-burning mouth syndrome show that many published videos provide unreliable information [28]. Finally, a systematic review of healthcare information available on YouTube found that the platform stores a large amount of data, but some of the information presented is misleading or untrue [9]. The aggregate results of this and previous studies suggest that healthcare authorities have a responsibility to regulate the content of healthcare-related






videos available on YouTube and other social media platforms. Healthcare authorities also need to create more attractive video content to increase viewership. No less important is the responsibility of social media providers to establish special channels that contain only validated healthcare information.

The main limitation of this research is related to the dynamics of rapid data change. The number of views, likes, and dislikes today may be different from next week. To address this limitation, the two observers agreed on a date to make observations so that the available data would not be significantly different. Observational bias from observers can also occur; to avoid this, it is necessary to calibrate perceptions related to operational definitions of the variables being measured. Another limitation concerns the determination of search keywords. The existence of two or more terms may not be detected through Google trends, and this can reduce the number of videos obtained. The ideal instrument for evaluating YouTube videos should include an image or visual quality, sound, technical design, authority, education element, content accuracy and clarity [29]. Although the instrument used in this study does not include all the aspects ideally, the results of this study are nevertheless important because YouTube is the fastest and most accessible platform for disseminating information.

## Conclusion

Based on the number of views and likes, videos uploaded by laypersons receive a higher number of views and likes than those created by healthcare professionals, but the quality of the information is not adequate and accurate. Therefore, viewers need to be critical when collecting or using information taken from YouTube to make a good decision in oral healthcare-related tooth whitening.

## Authors' Contributions

YLR		<a href="https://orcid.org/0000-0003-3966-0551">https://orcid.org/0000-0003-3966-0551</a>	Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft and Writing - Review and Editing.
LVCN		<a href="https://orcid.org/0000-0003-0940-9868">https://orcid.org/0000-0003-0940-9868</a>	Validation, Resources, Data Curation, Writing - Original Draft and Writing - Review and Editing.
NRA		<a href="https://orcid.org/0000-0001-9263-3259">https://orcid.org/0000-0001-9263-3259</a>	Validation, Resources, Data Curation, Writing - Original Draft and Writing - Review and Editing.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

## Financial Support

This research was financially supported by Universitas Brawijaya (Grant number: 1064/UN10.F14/PN/2021), Indonesia.

## Conflict of Interest

The authors declare no conflicts of interest.

## Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

## References

- [1] Joiner A, Luo W. Tooth colour and whiteness: a review. *J Dent* 2017; 67(Supplement):S3-S10. <https://doi.org/10.1016/j.jdent.2017.09.006>
- [2] Tin-Oo MM, Saddki N, Hassan N. Factors influencing patient satisfaction with dental appearance and treatments they desire to improve aesthetics. *BMC Oral Health* 2011; 11(1):7-9. <https://doi.org/10.1186/1472-6831-11-6>
- [3] Nora N. Public attitude and awareness towards their teeth color and dental bleaching in Saudi Arabia: a cross-sectional survey. *J Public Heal Epidemiol* 2016; 8(4):45-52. <https://doi.org/10.5897/jphe2015.0785>
- [4] Azodo CC, Ogbomo AC. Self-evaluated dental appearance satisfaction among young adults. *Ann Med Health Sci Res* 2014; 4(4):603-7. <https://doi.org/10.4103/2141-9248.139339>
- [5] Chan LC, Ho DYH, Ko MSK, Liu YMY, Mok TYO, Sou SKH, et al. The pursuit of bright smile – tooth whitening among Hong Kong young adults. University of Hong Kong: Faculty of Dentistry. Community Health Project; 2013.

- [6] Widodo PN, Soetjijpta NL, Palupi R. Perception and knowledge of patients towards teeth whitening treatment. *EurAsian J Biosci* 2020; 14(2):3759-64.
- [7] Gholami-Kordkheili F, Wild V, Strech D. The impact of social media on medical professionalism: A systematic qualitative review of challenges and opportunities. *J Med Internet Res* 2013; 15(8):e184. <https://doi.org/10.2196/jmir.2708>
- [8] Bezner SK, Hodgman EI, Diesen DL, Clayton JT, Minkes RK, Langer JC, et al. Pediatric surgery on YouTube™: is the truth out there? *J Pediatr Surg* 2014; 49(4):586-9. <https://doi.org/10.1016/j.jpedsurg.2013.08.004>
- [9] Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare information on YouTube: a systematic review. *Health Informatics J* 2015; 21(3):173-94. <https://doi.org/10.1177/1460458213512220>
- [10] Sampson M, Cumber J, Li C, Pound CM, Fuller A, Harrison, D. A systematic review of methods for studying consumer health YouTube videos, with implications for systematic reviews. *PeerJ* 2013; 2013(1):1-16. <https://doi.org/10.7717/peerj.147>
- [11] Butler DP, Perry F, Shah Z, Leon-Villapalos J. The quality of video information on burn first aid available on YouTube. *Burns* 2013; 39(5):856-9. <https://doi.org/10.1016/j.burns.2012.10.017>
- [12] Nason K, Donnelly A, Duncan HF. YouTube as a patient-information source for root canal treatment. *Int Endod J* 2016; 49(12):1194-1200. <https://doi.org/10.1111/iej.12575>
- [13] Simsek H, Buyuk SK, Cetinkaya E, Tural M, Koseoglu MS. "How I whiten my teeth": YouTube™ as a patient information resource for teeth whitening. *BMC Oral Health* 2020; 20(1):1-6. <https://doi.org/10.1186/s12903-020-01172-w>
- [14] Dahono, Y. Data: Ini Media Sosial Paling Populer di Indonesia 2020-2021. 2021. Available from: <https://www.beritasatu.com/digital/733355/data-ini-media-sosial-paling-populer-di-indonesia-20202021>. [Accessed on August 28, 2021].
- [15] Hassona Y, Taimeh D, Marahleh A, Scully C. YouTube as a source of information on mouth (oral) cancer. *Oral Dis* 2016; 22(3):202-8. <https://doi.org/10.1111/odi.12434>
- [16] Gaş S, Zincir Ö, Bozkurt AP. Are YouTube videos useful for patients interested in botulinum toxin for bruxism? *J Oral Maxillofac Surg* 2019; 77(9):1776-83. <https://doi.org/10.1016/j.joms.2019.04.0>
- [17] American Dental Association. Oral Health Topics: Whitening. Available from: <https://www.ada.org/en/member-center/oral-health-topics/whitening>. [Accessed on May 21, 2021].
- [18] Bernard A, Langille M, Hughes S, Rose C, Leddin D, Veldhuyzen Van Zanten S. A systematic review of patient inflammatory bowel disease information resources on the world wide web. *Am J Gastroenterol* 2007; 102(9):2070-7. <https://doi.org/10.1111/j.1572-0241.2007.01325.x>
- [19] Ustidal G, Guney AU. YouTube as a source of information about orthodontic clear aligners. *Angle Orthod* 2020; 90(3):419-24. <https://doi.org/10.2319/072419-491.1>
- [20] Staňková P, Horkelová J, Lučzewská J, Tichá J, Zimčíková S, Černobila J. The key factors influencing clients' decision-making in the market of selected planned healthcare in the Czech Republic. *J Compet* 2017; 9(4):94-113. <https://doi.org/10.7441/joc.2017.04.07>
- [21] Sohn JW, Kim JK. Factors that influence purchase intentions in social commerce. *Technol Soc* 2020; 63:101365. <https://doi.org/10.1016/j.techsoc.2020.101365>
- [22] Gerhards C. Product placement on YouTube: an explorative study on YouTube creators' experiences with advertisers. *Convergence* 2019; 25(3):516-533. <https://doi.org/10.1177/1354856517736977>
- [23] Ramadhani A, Zettira Z, Rachmawati YL, Hariyani N, Maharani DA. quality and reliability of halitosis videos on YouTube as a source of information. *Dent J* 2021; 9(10):120. <https://doi.org/10.3390/dj9100120>
- [24] Kovalski LNS, Cardoso FB, D'Avila OP, Corrêa APB, Martins MAT, Martins MD, et al. Is the YouTube™ an useful source of information on oral leukoplakia? *Oral Dis* 2019; 25(8):1897-1905. <https://doi.org/10.1111/odi.13161>
- [25] American Academy of Pediatric Dentistry. Policy on the Use of Dental Bleaching for Child and Adolescent Patients. *The Reference Manual of Pediatric Dentistry*. Chicago, Ill.: American Academy of Pediatric Dentistry; 2021:116-9.
- [26] Visscher BB, Steunenbergh B, Heijmans M, Hofstede JM, Devillé W, Van Der Heide I, et al. Evidence on the effectiveness of health literacy interventions in the EU: a systematic review. *BMC Public Health* 2018; 18(1):1-12. <https://doi.org/10.1186/s12889-018-6331-7>
- [27] Fortuna G, Schiavo JH, Aria M, Mignogna MD, Klasser GD. The usefulness of YouTube™ videos as a source of information on burning mouth syndrome. *J Oral Rehabil* 2019; 46(7):657-65. <https://doi.org/10.1111/joor.12796>
- [28] Azer SA. Are DISCERN and JAMA Suitable instruments for assessing YouTube videos on thyroid cancer? Methodological concerns. *J Canc Educ* 2020; 35(6):1267-77. <https://doi.org/10.1007/s13187-020-01763-9>