Original Article

YouTube as a source of information about orthodontic clear aligners

Gokay Ustdal[a]; Ayca Ustdal Guney[b]

ABSTRACT

Objectives: To evaluate the content, reliability, and quality of videos about orthodontic clear aligners on YouTube.

Materials and Methods: Researchers used the Google Trends website to determine that the most frequently used search term for orthodontic clear aligners on the Internet was: "Invisalign." A search was then conducted on YouTube using the key word "Invisalign." From the first 140 results, 100 videos were selected for analysis. A 13-point content score was used to classify poor-content and rich-content videos, and the global quality scale (GQS) was used to examine quality of the videos. To evaluate reliability of the information, a five-question scale was used. The Mann-Whitney *U*-test, χ^2 test, and Pearson correlation coefficients were used for statistical evaluations.

Results: Of the YouTube videos, 33 were classified as rich content and 67 as poor content. Most videos (73%) were uploaded by laypeople, and most uploaders (71%) were women. The most commonly discussed content was instructions (65%), followed by procedure (57%) and pain (52%). Regarding the GQS, most of the videos were evaluated as moderate quality (51%). Compared with the poor-content video group, the rich-content video group had a significantly higher GQS score ($P = .004$). There was no significant difference between the poor-content and rich-content groups regarding information reliability ($P > .05$).

Conclusions: Video content on YouTube relating to aligner orthodontics was generally insufficient. The quality of videos was moderate, but the reliability of information was generally poor. Specialists should refer patients to reliable sources of information. (*Angle Orthod.* 2020;90:419–424.)

KEY WORDS: Clear aligners; Invisalign; Social media; YouTube

INTRODUCTION

In recent years, increasing expectations about physical appearance have led people from different socioeconomic and age groups to seek orthodontic treatment. However, the visibility of orthodontic devices during treatment causes esthetic concerns. For patients with these concerns, different treatment alternatives, such as ceramic brackets, lingual orthodontics, and clear aligners, are available.[1,2]

The use of multiple thermoplastic aligners was first developed by Kesling in 1945 to correct dental crowding.[3] However, modern aligner technology became widely used in orthodontic practice after 1999 with the introduction of Invisalign (Align Technology, San Jose, Calif).[4] Although Invisalign was initially used for the treatment of simple tooth irregularities, the system developed over time and can now be used to treat more complex malocclusions. Thus, Invisalign gained popularity as one of the most esthetic options for tooth movement and is now one of the most widely used aligner systems.[5]

Today, a significant portion of the world's population has access to numerous websites and social media platforms that provide health care information. In recent surveys, 80% of Internet users reported accessing online health information.[6,7] As a social media platform, health video blogs (vlogs) also have the potential to support health education and improve health information literacy.[8] Patients usually prefer using YouTube when searching for health information because this medium provides visual and audio information.[9,10] More than 1.9 billion users visit YouTube each month, and people watch more than 1 billion hours of videos, which are viewed billions of times. YouTube is available in 80 languages, reaching 95% of the Internet population.[11]

[a] Private Practice, Adana, Turkey.

[b] Assistant Professor, Department of Orthodontics, Faculty of Dentistry, Cukurova University, Adana, Turkey.

Corresponding author: Dr Ayca Ustdal Guney, Department of Orthodontics, Faculty of Dentistry, Cukurova University, Balcali, Adana, Turkey
(e-mail: ayca.ustdal@hotmail.com)

Accepted: January 2020. Submitted: July 2019.
Published Online: February 11, 2020

Currently, orthodontic patients can easily obtain information about topics in which they are interested by using social media. Accuracy of the information obtained may then affect patients' participation in the treatment process.[9,10] Thus, the aim of this study was to evaluate the content, reliability, and quality of videos about orthodontic clear aligners on YouTube.

MATERIALS AND METHODS

The Google Trends website (https://trends.google.com) was used to find the most frequently used search term for "orthodontic clear aligner." The search parameters were adjusted to "worldwide" and the "past 5 years." After a few attempts with possible key words related to clear aligners, new key word ideas were defined by using the related-queries table on the application. Comparative searches were conducted with defined key words that included "aligners," "clear aligners," "Invisalign," "SmileDirect," and "ClearCorrect." Based on comparative search results, it was determined that the most commonly used search term for "orthodontic clear aligners" was Invisalign. (Google Trends, September 1, 2018).

On the YouTube website (https://www.youtube.com), a search was conducted on September 1, 2018, for Invisalign to evaluate the information available about orthodontic clear aligners; the default relevance filter was used. Before searching on YouTube, cookies and previous search results were deleted. As search results may change at different moments, a playlist was created to save the initial search results. Videos ($n = 140$) appearing on the first seven pages of the search were examined for this study. Research previously showed that 90% of search-engine users click on an outcome on the first three pages of search results.[12] Videos were excluded if they had no audio, were not in English, were longer than 15 minutes, were duplicates, or were not relevant to the subject. Advertisements originating on YouTube were not considered in the analysis.

All videos were viewed in their entirety, and several general parameters were recorded for each: number of views, number of likes and dislikes, number of comments, days since upload, and video length in minutes. Viewers' interaction was calculated using the following interaction index and viewing rate formulas[13]:

$$\text{Interaction index}\,(\%) = \frac{\text{number of likes} - \text{number of dislikes}}{\text{number of views}} \times 100$$

$$\text{Viewing rate}\,(\%) = \frac{\text{number of views}}{\text{number of days since upload}} \times 100$$

Video sources were classified into five groups: dentist/orthodontist, health institution, dental company, layperson, and other. Video targets were organized into three groups: layperson, professional, and both.

Table 1. Evaluation of Information Reliability[14] of Orthodontic Clear Aligner Videos

Reliability Score[a]
1. Are the aims clear and achieved?
2. Are reliable sources of information used? (ie, publication cited, speaker is an orthodontist)
3. Is the information presented balanced and unbiased?
4. Are additional sources of information listed for patient reference?
5. Are areas of uncertainty mentioned?

[a] One point for "yes", zero points for "no."

A 13-point score was used to evaluate video content: (1) definition of clear aligners, (2) procedure of clear aligner therapy, (3) usage instructions for clear aligners, (4) comparison of treatment options (metal brackets, esthetic brackets, lingual brackets, clear aligners), (5) biomechanics of clear aligner therapy, (6) pain, (7) oral hygiene, (8) soft tissue soreness, (9) speech performance, (10) psychosocial aspects, (11) cost of treatment, (12) treatment success, and (13) treatment time. Videos for each content point were scored as 0 (not included) or 1 (included), and a total content score was assigned. Videos scored as <7 points were classified as poor-content videos, and those scored as ≥ 7 points were classified as rich-content videos.

For assessing the reliability of information, an adapted form[14] of the DISCERN tool (an instrument for judging the quality of written consumer health information about treatment choices)[15] was used (Table 1). The survey contained 5 questions.[14] For each question, the answer "no" scored 0 points and the answer "yes" scored 1 point. A reliability score was obtained by calculating the total of these points. To evaluate video quality, a 5-point scale, the global quality scale (GQS), was applied (Table 2).[16]

Twenty videos were randomly selected and examined by the same operator (Dr Ustdal) 1 month later to

Table 2. GQS Criteria[16] Used to Score Orthodontic Clear Aligner Videos on YouTube[a]

GQS Definition	GQS Score
Poor quality, poor flow of the video, most information missing, not at all useful for patients	1
Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients	2
Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients	3
Good quality and generally good flow, most of the relevant information is listed but some topics not covered, useful for patients	4
Excellent quality and flow, very useful for patients	5

[a] GQS indicates global quality scale.

Table 3. Descriptive Statistics of Evaluated Videos[a]

Variables	Minimum	Maximum	Mean	SD
Video characteristics				
No. of views	48	1,123,748	113,839.07	201,946.676
No. of likes	1	29,641	938.93	3079.747
No. of dislikes	0	880	52.56	112.068
No. of comments	0	4126	153.40	433.439
Video length (minutes)	1:02	14:43	7:40	3:45
Days since upload	5	2571	727.95	617.459
Interaction index	–1.05	5.60	1.00	1.15
Viewing rate	140.16	1,345,160	30,537.71	135,495.57
Reliability score	0	4	2.01	0.948
Content score	0	11	5.13	2.788
GQS	1	5	3.08	0.800

[a] GQS indicates global quality scale; SD, standard deviation.

calculate intrarater reliability. All videos were also reviewed by a second examiner (Dr Ustdal Guney) to evaluate interrater reliability. Both reviewers specialized in orthodontics. As the study included only publicly available data, it did not require approval from the local research ethics committee.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) software program (version 21; SPSS Inc, Chicago, Ill) was used for statistical evaluations. The normality of the data distribution was evaluated using the Shapiro-Wilk test. Mann-Whitney U and χ^2 tests were used for comparison of the poor-content and rich-content video groups. Pearson correlation coefficients were also calculated to evaluate possible correlations between GQS, content, and reliability scores. Intraclass correlation coefficients (ICCs) were calculated to define intrarater and interrater reliability. Statistical significance was evaluated at the $P < .05$ level.

RESULTS

Of the 140 videos, 40 were excluded from the study because they were not in English (n = 21), were longer than 15 minutes (n = 17), were not related to the subject (n = 4), or were silent (n = 3). Descriptive statistics for the evaluated videos are shown in Table 3. The mean total number of video views was 113,839.07. The mean number of comments was 153.40, mean number of likes was 938.93, and the mean number of dislikes was 52.56. The mean interaction index was 1.00, and the mean viewing rate was 30,537.71. The mean content score was 5.13, mean reliability score was 2.01, and mean GQS score was 3.08.

Demographics for the examined videos, including video source, gender of uploader, and video target, are reported in Table 4. Most videos were uploaded by a layperson (73%), and most uploaders were women (71%). The video target was generally a layperson (90%). Regarding video content, instructions were the most commonly discussed topic (65%), followed by procedure (57%), pain (52%), oral hygiene (51%), speech performance (45%), psychosocial aspects (43%), and treatment success (41%); the least featured video topics were biomechanics (8%), definition of clear aligners (24%), cost of treatment (27%), comparison of treatment options (28%), and soft tissue soreness (31%).

Regarding reliability score, most videos did not use reliable sources of information (82%); generally, there were no additional sources of information for patient reference (92%) and areas of uncertainty were usually not mentioned (77%). Conversely, in most videos the aims were clear and achieved (79%), and in most cases the information presented was balanced and unbiased (71%). According to the GQS results, 51% of the videos were moderate in quality, 20% were poor or generally poor, and 29% were good or excellent.

Regarding content score, 33 videos were classified as rich content and 67 as poor content. Comparison of variables between rich- and poor-content videos is

Table 4. Demographics for Poor-Content and Rich-Content Video Groups

Video Demographics	Poor Content (n = 67), No. (%)	Rich Content (n = 33), No. (%)	Total N (%)
Source of video			
Dentist/orthodontist	10 (14.9)	2 (6.1)	12 (12)
Health institution	2 (3)	0 (0)	2 (2)
Dental company	11 (16.4)	1 (3)	12 (12)
Layperson	44 (65.7)	29 (87.9)	73 (73)
Other	0 (0)	1 (3)	1 (1)
Gender of uploader			
Woman	48 (71.6)	24 (72.7)	72 (72)
Man	19 (28.4)	9 (27.3)	28 (28)
Target of video			
Layperson	58 (86.6)	32 (97)	90 (90)
Professional	3 (4.5)	0 (0)	3 (3)
Both	6 (9)	1 (3)	7 (7)

Table 5. Comparison of Variables Between Poor-Content and Rich-Content Videos[a]

Variables	Poor Content (n = 67)		Rich Content (n = 33)		*P* Value
	Mean	SD	Mean	SD	
No. of views	104,106.38	188,128.95	133,599.36	229,287.36	.777
No. of likes	540.83	850.80	1747.18	5181.23	.132
No. of dislikes	32.04	43.05	94.21	179.89	.263
No. of comments	102.19	167.33	257.36	711.92	.047*
Video length (minute)	6:41	3:30	9:40	3:28	<.001***
Days since upload	798.20	666.26	585.30	482.32	.131
Interaction index	0.93	1.15	1.13	1.15	.042*
Viewing rate	34,886.52	164,706.24	21,708.30	26,953.99	.138
Reliability score	2	1.01	2.03	0.81	.772
GQS	2.91	0.79	3.42	0.71	.004**

[a] GQS indicates global quality scale; SD, standard deviation.
* $P < .05$, ** $P < .01$, *** $P < .001$.

reported in Table 5. The rich-content group had greater averages for video length ($P < .001$), number of comments ($P = .047$), and interaction index ($P = .042$) than the poor-content group. However, there were no statistically significant differences between the poor-content and rich-content groups regarding video source, uploader gender, and video target ($P > .05$). Compared with the poor-content group, the rich-content group had a significantly higher GQS score ($P = .004$). However, there was no significant difference between groups regarding reliability score ($P > .05$).

There was a moderate correlation between GQS and content score ($r = 0.412$, $P < .01$) and between GQS and reliability score ($r = 0.398$, $P < .01$). There was no significant correlation between reliability score and content score ($P > .05$) (Table 6). For intrarater reliability, ICC values varied from 0.920 to 0.965, and for interrater reliability, ICC values varied from 0.890 to 0.928.

DISCUSSION

The knowledge and cooperation of orthodontic patients plays an important role in the potential success of treatment. Many patients research orthodontic treatment, but, unlike scientific platforms, social media is easily accessible.[17] Due to the increasing use of digital technologies to obtain health information, practitioners should be aware of the content, reliability, and quality of such information so that they can guide patients appropriately.[18] Al-Silwadi et al.[9] found that visual and auditory social media sources such as YouTube had a positive effect on the knowledge levels of orthodontic patients. Because YouTube provides audiovisual information, patients often preferred this medium to other social media platforms to seek health information.[9,10]

The video characteristics of this study showed that YouTube users watched videos about Invisalign treatment at high rates, often uploaded videos, and frequently interacted with other users via comment, like, and dislike features. According to mean GQS score, the videos in this study were generally of moderate quality, whereas the mean reliability score showed that video reliability was generally poor. Yavuz et al.[19] reported that the content was excellent regarding YouTube videos related to accelerated orthodontics. On the other hand, they found that videos were still not fully reliable. Grewal et al.[20] reported that the content of YouTube videos about orthognathic surgery showed moderate quality.

According to content analysis, the number of videos with rich content was limited (33%). This suggested that YouTube was insufficient as a source of information about Invisalign therapy. Similar to the current study, Lena and Dindaroğlu[10] reported that the content of YouTube videos about lingual orthodontics was incomplete.

Table 6. Correlation Matrix Displaying Pearson Correlation Coefficients Between Scores for Content Score, GQS, Reliability Score and Video Demographics[a]

Variables	Content Score	GQS	Reliability Score	No. of Views	No. of Likes	No. of Dislikes	No. of Comments	Video Length	Days Since Upload
Content score	1	0.412**	0.087	–0.002	0.124	0.186	0.119	0.450**	–0.241*
GQS	0.412**	1	0.398**	0.167	–0.221*	–0.177	–0.241	0.047	0.157
Reliability score	0.087	0.398**	1	–0.079	–0.238*	–0.143	–0.259**	–0.075	0.028

[a] GQS indicates global quality scale.
* $P < .05$, ** $P < .01$.

Most videos provided content about instructions, procedure, and pain, whereas the least mentioned topic was biomechanics; this may be because most videos were uploaded by patients/laypeople (73%). Although aligner therapy usually requires extra attachment applications, interproximal reduction, and interarch elastics, such biomechanical issues were rarely discussed in the videos, which can be explained by the scarcity of specialist uploaders. The findings about video source were similar to previous studies, which found that most medical videos were uploaded from patient sources.[10,21,22]

In the current study, the rich-content versus poor-content video group had higher GQS scores, and a moderate correlation was evident between GQS and content score. Similarly, Lena and Dindaroğlu[10] also found a moderate correlation between quality and content in their YouTube analyses about lingual orthodontics. Information flow and the high number of informative elements in videos, such as images and video captions, increased quality and content scores. This may explain the correlation between content score and quality score. A moderate correlation was also found between GQS and reliability score. Videos that used reliable sources and contained balanced information were more useful for patients; this may explain the correlation.

Several studies in the literature have evaluated medical YouTube videos[7–9,15,16,23–25]; however, only a few studies have evaluated orthodontic YouTube videos.[10,22,26] One YouTube analysis by Livas et al.[26] was based on video content and metric evaluations of patients' Invisalign experiences. However, the current study design was very different as it is the only study evaluating three important elements together: video quality, reliability, and content. In their Twitter analysis, Noll et al.[27] evaluated tweets from patients receiving orthodontic treatment with Invisalign or braces. However, they found no significant difference between these two treatment modalities. Search results from YouTube and other search engines are inconsistent, as new videos are added, or old videos deleted, every day. Also, the order of search results changes over time and by interaction. Therefore, a limitation of the current study was that the data collection method was instantaneous, as for similar studies. This study, in which only English videos were analyzed, included mostly videos uploaded from native English-speaking countries, which was a geographic limitation. However, English is a global language,[28] and it is possible to access English information from anywhere in the world.

CONCLUSIONS

- The YouTube videos identified about clear aligner orthodontics were generally of moderate quality. However, reliability of the video information was usually poor, and video content was generally insufficient. Most videos mentioned usage instructions for clear aligners, but only a few videos discussed the biomechanics of clear aligner therapy.
- In summary, results from this study indicate that YouTube is not currently a suitable source of information for patients about clear aligner therapy. Orthodontists need to make further efforts to create reliable and quality medical content on popular social media platforms such as YouTube.

REFERENCES

1. McCrostie HS. Lingual orthodontics: the future. *Semin Orthod*. 2006;12:4.
2. Rossini G, Parrini S, Castroflorio T, Deregibus A, Debernardi CL. Efficacy of clear aligners in controlling orthodontic tooth movement: a systematic review. *Angle Orthod*. 2015;85: 881–889.
3. Kesling HD. The philosophy of the tooth positioning appliance. *Am J Orthod Oral Surg*.1945;31:297–304.
4. Bouchez R. *Clinical Success in Invisalign Orthodontic Treatment*. Paris: Quintessence International; 2010.
5. Galan-Lopez L, Barcia-Gonzalez J, Plasencia E. A systematic review of the accuracy and efficiency of dental movements with Invisalign®. *Korean J Orthod*. 2019;49: 140–149.
6. Hesse BW, Moser RP, Rutten LJF, Kreps GL. The health information national trends survey: research from the baseline. *J Health Commun*. 2006;11:vii–xvi.
7. Atkinson N, Saperstein S, Pleis J. Using the internet for health-related activities: findings from a national probability sample. *J Med Internet Res*. 2009;11:e4.
8. Huh J, Liu LS, Neogi T, Inkpen K, Pratt W. Health vlogs as social support for chronic illness management. *ACM Trans Comput Hum Int*eract. 2014;21:23.
9. Al-Silwadi FM, Gill DS, Petrie A, Cunningham SJ. Effect of social media in improving knowledge among patients having fixed appliance orthodontic treatment: a single-center randomized controlled trial. *Am J Orthod Dentofacial Orthop*. 2015;148:231–237.
10. Lena Y, Dindaroğlu F. Lingual orthodontic treatment: a YouTube™ video analysis. *Angle Orthod*. 2017;88:208–214.
11. YouTube. About YouTube. Available at: https://www.youtube.com/yt/about/press. Accessed July 10, 2019.
12. iProspect. Search Engine User Behaviour Study (April 2006). Available at: http://district4.extension.ifas.ufl.edu/Tech/TechPubs/WhitePaper_2006_SearchEngineUserBehavior.pdf. Accessed July 10, 2019.
13. Hassona Y. Taimeh D. Marahleh A. Scully C. YouTube as a source of information on mouth (oral) cancer. *Oral Dis*. 2016; 22:202–208.
14. Singh AG, Singh S, Singh PP. YouTube for information on rheumatoid arthritis—a wakeup call? *J Rheumatol*. 2012;39: 899–903.
15. Charnock D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Community Health*.1999;53:105–111.

16. Bernard A, Langille M, Hughes S, et al. A systematic review of patient inflammatory bowel disease information resources on the World Wide Web. *Am J Gastroenterol*. 2007;102: 2070–2077.
17. Nason GJ, Kelly P, Kelly ME, et al. YouTube as an educational tool regarding male urethral catheterization. *Scand J Urol*. 2015;49:189–192.
18. Bylund CL, Gueguen JA, Sabee CM, et al. Provider–patient dialogue about Internet health information: an exploration of strategies to improve the provider–patient relationship. *Patient Educ Couns*. 2007;66:346–352.
19. Yavuz MC, Buyuk SK, Genc E. Does YouTube™ offer high quality information? Evaluation of accelerated orthodontics videos, *Ir J Med Sci*. 2019 Oct 24. doi: 10.1007/s11845–019-02119-z.
20. Grewal J, Marria G, Goel S. Information content of YouTube videos on orthognathic surgery – helpful? *Indian J Dent Sci*. 2019;11:2:90–294.
21. Clerici CA, Veneroni L, Bisogno G, Trapuzzano A, Ferrari A. Videos on rhabdomyosarcoma on YouTube: an example of the availability of information on pediatric tumors on the web. *J Pediatr Hematol Oncol*. 2012;34:e329–e331.
22. Hegarty E, Campbell C, Grammatopoulos E, et al. YouTube™ as an information resource for orthognathic surgery. *J Orthod*. 2017;44:90–96.
23. Drozd B, Couvillon E, Suarez A. Medical YouTube videos and methods of evaluation: literature review. *JMIR Med Educ*. 2018;4:e3.
24. Delli K, Livas C, Vissink A, Spijkervet FK. Is YouTube useful as a source of information for Sjögren's syndrome? *Oral Dis*. 2016;22:196–201.
25. Shires CB, Wilson CD, Sebelik M. Thyroid surgery YouTube videos: estimating quality by surgeon characteristics and view rate. *Gland Surg*. 2019;8:207–211.
26. Livas C, Delli K, Pandis N. "My Invisalign experience": content, metrics and comment sentiment analysis of the most popular patient testimonials on YouTube. *Prog Orthod*. 2018;19:3.
27. Noll D, Mahon B, Shroff B, Carrico C, Lindauer SJ. Twitter analysis of the orthodontic patient experience with braces vs Invisalign. *Angle Orthod*. 2016;87:377–383.
28. Guilherme M. English as a global language and education for cosmopolitan citizenship. *Lang Intercult Comm*. 2007;7: 72–90.