Is YouTube a reliable source of information on toothpaste? A digital health assessment of video quality, content and implications for dental public health

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ABSTRACT

Background. Dental biofilm control, which is critical for the prevention of dental caries and periodontal diseases, is supported not only by mechanical measures but also by chemical agents such as toothpaste, and its effectiveness depends on the availability of accurate information. As a substantial proportion of adults obtain health information from online sources, YouTube has emerged as a prominent platform for oral-health–related content. Therefore, the aim of this study was to systematically evaluate the content quality and reliability of YouTube videos related to toothpaste.
Methods. To identify the most frequently searched terms, Google Trends data were examined, and the commonly used search expressions 'toothpaste' and 'best toothpaste' were selected as the primary keywords. In this cross-sectional study, a total of 325 YouTube videos were screened, and 38 videos that met the inclusion criteria were included in the analysis. Basic video characteristics and upload sources were recorded. Video quality was assessed using Global Quality Score (GQS), Video Information and Quality Index (VIQI), and DISCERN reliability tool. Content quality scores were also analyzed.
Results. Most of the analyzed videos were uploaded by oral health professionals (86.8%). According to the GQS assessment, 42.1% of the videos were classified as of moderate quality, whereas only 21.1% were identified as high quality. Based on the DISCERN evaluation, the majority of videos demonstrated low quality; 52.6% of the content was rated as poor and 44.7% as moderate. The content analysis score showed a significant and positive correlation with VIQI, GQS, and DISCERN.
Conclusion. The findings indicate that YouTube content related to toothpaste is limited in both quality and quantity and contains substantial information gaps, suggesting that oral health professionals should generate more reliable, high-quality content and that existing videos should be regularly monitored for quality assurance.

Submitted 5 March 2026
Accepted 5 October 2026
Published 17 November 2026

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Academic editor
João Paulo Tribst

Additional Information and Declarations can be found on page 16

DOI **10.7717/peerj.21937**

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OPEN ACCESS

Subjects Dentistry, Public Health, Healthcare Policy
Keywords Dental public health, Toothpaste, YouTube

How to cite this article Uytun M, Bayırlı AB, Genç YS, Erdem R, Yıldırım A, Atasever İşler AA. 2026. Is YouTube a reliable source of information on toothpaste? A digital health assessment of video quality, content and implications for dental public health. *PeerJ* **14**:e21937
http://doi.org/10.7717/peerj.21937

INTRODUCTION

The World Health Organization defines oral health as a condition in which individuals can perform basic functions such as chewing and speaking without pain, discomfort, or feelings of embarrassment (*Organization, 2022*). According to the Global Oral Health Status Report published in late 2022, various oral diseases—most notably severe periodontal diseases and dental caries—affect approximately 50% of the global population (*Jain et al., 2024*). Moreover, severe periodontal diseases are known to interact with several systemic conditions and adversely impact overall human health (*Tonetti et al., 2017*). Dental biofilm is recognized as the primary etiological factor in the development of dental caries and periodontal diseases. Therefore, the prevention of these conditions depends on the effective and regular removal of dental biofilm (*Cota et al., 2021*).

Biofilm control primarily relies on toothbrushing and the removal of plaque from interdental areas. Effective removal of plaque from tooth surfaces requires a high level of individual motivation and manual dexterity (*Van der Weijden & Hioe, 2005*). In addition to these mechanical biofilm control methods, the use of chemical agents such as toothpaste has been shown in various studies to provide additional benefits in achieving plaque control and reducing gingivitis. Fluoridated toothpastes are well established as essential agents in the prevention of dental caries. Furthermore, a wide range of toothpaste formulations is available to address different oral health concerns, including dentin hypersensitivity, tooth whitening, and periodontal diseases. These widely used products are also offered at a relatively affordable cost (*Jepsen et al., 2017*; *Lippert, 2013*).

Despite this, the number of individuals who can maintain proper and effective oral hygiene remains limited (*Van der Weijden & Hioe, 2005*). Therefore, the adoption and reinforcement of appropriate oral hygiene practices are essential.

Health-related recommendations have traditionally been delivered by oral health professionals through written and verbal communication. However, patients today increasingly tend to obtain health information from the internet (*Ramsey et al., 2017*; *Wu, Li & Lin, 2024*). A study conducted in Europe reported that approximately 60% of adults use online resources to access health information (*Eurobarometer, 2014*). Unlike traditional methods, online materials—particularly short, concise, and replayable video content—appear to meet individuals' medical information needs more effectively (*Wu, Li & Lin, 2024*). Nevertheless, the reliability and quality of these easily accessible online sources are frequently questioned (*Chu et al., 2017*).

YouTube, founded in 2005, has become the most popular video-sharing platform, with approximately 2 billion daily views (*Hassona et al., 2016*; *Yalcin-ulker & Duygu, 2023*). Its free-to-use structure has contributed to a growing number of individuals seeking information through the platform (*Aksoy & Topsakal, 2022*). However, because it is freely accessible and open to all users, uploaded content may contain inaccurate or incomplete information (*Hassona et al., 2016*). Moreover, research indicates that YouTube is among the most frequently consulted platforms for medical information seeking (*Bezner et al., 2014*). A substantial number of videos addressing various medical and oral health conditions are available on this platform (*Abukaraky et al., 2018*; *Basch*

et al., 2018; *Desai et al., 2013*; *Kaval et al., 2022*; *Wu, Li & Lin, 2024*). Although these analytical approaches have been widely applied to other oral health topics, including oral hygiene practices (*Kuka & Gursoy, 2024*; *Oz & Kirzioglu, 2021*) and oral health education (*Duman, 2020*), to the best of our knowledge no study to date has specifically examined toothpaste. This constitutes a distinct gap, as toothpaste selection is a self-directed, product-oriented decision with direct relevance to caries and periodontal disease prevention, and the present study therefore extends this established line of research to a clinically relevant topic that has not yet been investigated. Understanding the quality and comprehensiveness of the information presented in these videos may play an important role in determining public needs regarding proper toothpaste selection. Therefore, the aim of this study was to systematically assess and analyze the characteristics of YouTube videos related to toothpaste. We hypothesized that the quality and reliability of toothpaste-related YouTube videos would be insufficient.

MATERIALS AND METHODS

As this descriptive cross-sectional study utilized only publicly accessible online data, ethical approval was not required. To identify the most frequently searched terms related to toothpaste worldwide, Google Trends (https://trends.google.com) was used. Searches were conducted on January 12, 2025, applying the filters "YouTube Search", "Worldwide", and "Past 5 Years". Based on several pilot searches, the term "toothpaste" was identified as the most widely used keyword, and the YouTube video analysis was subsequently conducted using this term. The only filter applied during the YouTube search was the platform's default "relevance" setting. A new user account was created, and the computer's browsing history and cookies were cleared prior to performing the search. It was noted that YouTube's relevance-based search results are determined through a combination of factors including view count, rating, and upload date. More than 90% of YouTube users reportedly click on videos listed within the first three pages of search results, and 79% of users who do not find the desired information on the first page proceed to subsequent pages (*Fox & Duggan, 2013*).

Video selection and eligibility

Following the YouTube search, the URLs and metadata of the first 200 videos retrieved using the keyword "toothpaste"—including view count, likes, dislikes, number of comments, video duration, and uploader information—were extracted and recorded in a structured Excel file. These videos were then screened according to predefined eligibility criteria. Silent videos, non-English content, videos exceeding 15 min in length, duplicate entries, direct advertising materials, and videos irrelevant to the topic were excluded from the analysis. Videos that addressed toothpaste were included even when they also demonstrated tooth-brushing techniques; however, videos that presented brushing techniques without providing toothpaste-related information were excluded as off-topic. The 15-minute threshold was applied to standardise the dataset and to reflect typical viewing behaviour, as viewer attention and video completion rates tend to decline in longer videos (*Duman, 2020*; *Oz & Kirzioglu, 2021*; *Wu, Li & Lin, 2024*).

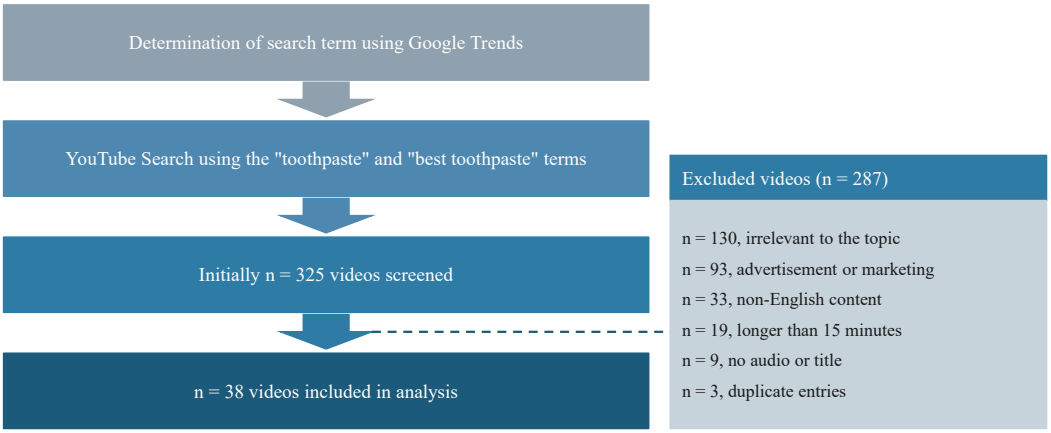

Figure 1 **YouTube search strategy diagram.**

Full-size DOI: 10.7717/peerj.21937/fig-1

Due to the limited number of eligible videos identified in the initial screening, an additional related search term—"best toothpaste", recommended by Google Trends—was incorporated to increase the sample size. Metadata from the 125 videos retrieved using this term were extracted in the same manner and added to the Excel dataset, after which the same eligibility criteria were applied. Ultimately, 325 videos were screened across the two search terms (200 retrieved with "toothpaste" and 125 with "best toothpaste"). Each video was assessed against the exclusion criteria in a predefined hierarchical order, and any video meeting more than one criterion was assigned to the first applicable reason, so that every excluded video was counted only once. The criteria were applied in the following order: (1) duplicate entries, (2) absence of audio or a descriptive title, (3) duration exceeding 15 min, (4) non-English content, (5) irrelevance to the topic, and (6) direct advertising content. The number of videos excluded for each reason is summarized in Fig. 1, and these counts sum to the total number of excluded videos, yielding 38 videos that met all predefined criteria for the final analysis.

All videos were evaluated independently by two researchers (M.U. and A.B.B.), who were blinded to each other's scores. To assess intra-rater reliability, one researcher (M.U.) re-evaluated all videos one month after the initial assessment. Prior to the formal assessment, both evaluators underwent a calibration exercise on a separate pilot set of videos not included in the final analysis to standardise the application of the DISCERN, Global Quality Score (GQS), Video Information and Quality Index (VIQI), and content-checklist criteria; any discrepancies were discussed until a common understanding was reached.

Interaction index and view ratio

The interaction index and view ratio were used to assess viewer engagement with the videos. Specific formulas were applied to calculate both the Interaction Index and the View Ratio (Fig. 2) (*Hassona et al., 2016*; *Loureiro et al., 2023*).

$$\text{Interaction Index} = \left(\frac{\text{Number of Likes} - \text{Number of Dislikes}}{\text{Total Number of Views}}\right) \times 100$$

$$\text{Viewing Rate (\%)} = \left(\frac{\text{Number of Views}}{\text{Number of Days Since Upload}}\right) \times 100$$

Figure 2 **Calculation of the interaction index and viewing rate.**
Full-size DOI: 10.7717/peerj.21937/fig-2

Content analysis

Videos were evaluated using a 10-item content checklist (Table 1). The checklist was developed primarily on the basis of the authors' clinical expertise and consensus (specialists in periodontology and orthodontics), and was further informed by the existing literature on toothpaste ingredients and formulations (*Lippert, 2013*) and on the role of fluoride toothpaste in the prevention of dental caries and periodontal disease (*Jepsen et al., 2017*). It was designed to capture the core clinically relevant domains of toothpaste-related information and comprised 10 scorable items, corresponding to four toothpaste types (items 1a–1d) and six additional content domains (items 2–7), as detailed in Table 1. Each item was scored dichotomously (0 = not included, 1 = included) and weighted equally, as there was no a priori basis to prioritise any single domain over the others. The total content score was calculated by summing the items, and videos covering more than half of the items (>5 points) were classified as high-content, while the remainder (≤5 points) were classified as low-content.

Global quality scale (GQS)

The GQS is a single global rating in which each video is assigned a score from 1 (low quality) to 5 (high quality) according to the rater's overall judgement of the video's flow, the completeness of the information provided, and its usefulness for patients (*Bernard et al., 2007*). No item- or component-level scoring is involved. Both raters applied the scale exactly as described in the original publication, which readers may consult for the full descriptors; no text from that publication is reproduced here.

Video information and quality index (VIQI)

The Video Information and Quality Index (VIQI) was used to evaluate the overall quality of the videos (*Nagpal et al., 2015*). VIQI consists of four criteria: information flow (VIQI-1), information accuracy (VIQI-2), video quality (VIQI-3), and consistency between the title and the content (VIQI-4). Each criterion was assessed using a 5-point Likert scale (*Albayrak & Büyükçavuş, 2023*). It should be noted that VIQI-2 represents a global, subjective judgement of perceived information accuracy, assigned by the two expert raters on a 5-point Likert scale according to their overall impression of the video. It does not

Table 1 Scoring criteria for content analysis.

		Content headings
1		**Types of toothpastes**
	a	Fluoridated
	b	Whitening
	c	Anti-sensitivity
	d	For periodontal diseases
2		**Content of toothpastes** What are the effects of fluoride, xylitol, and other active substances used in toothpastes on dental health?
3		**Innovations in toothpastes** Are natural and organic toothpastes really healthier? What are the contents of nature-friendly or organic toothpastes and their contributions to the environment? Probiotic and Activated Charcoal Toothpastes
4		**Effect of toothpastes on children** What are the advantages and disadvantages of toothpastes specially formulated for children?
5		**Amount of toothpaste use** How much should the amount of toothpaste be? Is the recommended amount different for adults and children?
6		**Effects of toothpaste on health** Which chemicals should be avoided? What are the chemical contents that should be considered in toothpaste use (for example, SLS, paraben)? Which contents should be considered in toothpastes used for children?
7		**Perceptions and errors in toothpaste use** What are the common wrong perceptions about toothpaste use and how do these perceptions affect dental health?

involve statement-by-statement verification of the claims made in each video against clinical guidelines or a predefined reference standard, and should therefore be interpreted as a perceived-accuracy rating rather than a formal accuracy audit.

DISCERN

Table 2 presents the items of the DISCERN reliability instrument, which provides criteria for evaluating how reliable and comprehensive a video is in terms of health information (*Charnock et al., 1999*). Each item assesses elements such as whether the video clearly states its purpose, its suitability for the target audience, the reliability of its information sources, the degree of impartiality, and the extent to which scientific evidence is provided. Collectively, these criteria aim to systematically determine the quality of a video as a patient information resource.

The DISCERN instrument evaluates information reliability using 16 questions (15 specific items and one overall assessment), each rated on a scale from 1 to 5. A score of 1 indicates that the criterion is not met, scores of 2–4 indicate that it is partially met, and a score of 5 indicates full compliance with the criterion. Based on the total scores, websites

Table 2 DISCERN reliability tool.

Has the purpose of the information presented in the video been clearly stated?
Is the video appropriate for the needs of the audience?
Does the video provide a comprehensive source of information on the topic being searched for?
Are the sources of information reliable and mentioned within the video?
Is the information in the video up to date?
Does the video present different possibilities and options regarding the information?
Is the video unbiased? (Does the presentation of information avoid any bias?)
Does the video include examples or case studies to support the accuracy of the information presented?
Does the video provide information to help the viewer make decisions among treatment options?
Does the video describe the benefits of each treatment?
Does the video describe the risks of each treatment?
To what extent does the video use scientific evidence and references?
Does the video describe how treatment options may affect quality of life?
Does the video explain that there may be more than one treatment option?
Does the video provide support to help the patient make a decision?
Based on your answers to all of the above questions, how would you rate the overall quality of the video as a source of information on treatment options?

Table 3 DISCERN score ranges and corresponding quality levels.

DISCERN score	Out of 100	Quality level
63–80	80% & above	Excellent
51–62	65% to 79%	Good
39–50	51% to 64%	Fair
27–38	37% to 50%	Poor
16–26	20% to 36%	Very poor

are categorized into five groups (Table 3). Reliability scores were calculated by summing the scores of all items (*Tahir et al., 2020*).

Licensing details for all assessment instruments used in this study are provided in the Instrument Licensing statement.

Statistical analysis

All statistical analyses were performed using IBM SPSS Statistics Version 27.0 (IBM Corp., Armonk, NY, USA). Frequencies and percentages were calculated for the descriptive characteristics of the videos. For data that did not follow a normal distribution, the Mann–Whitney U test was used to compare two independent groups. To assess inter-rater and intra-rater reliability, kappa correlation coefficients were calculated. A p-value of <0.05 was considered statistically significant.

RESULTS

After excluding videos that did not meet the predefined eligibility criteria, a total of 38 videos were included in the study. The Kappa agreement analysis demonstrated a high level of inter-rater reliability among the evaluators (Kappa = 0.80–0.95). In addition,

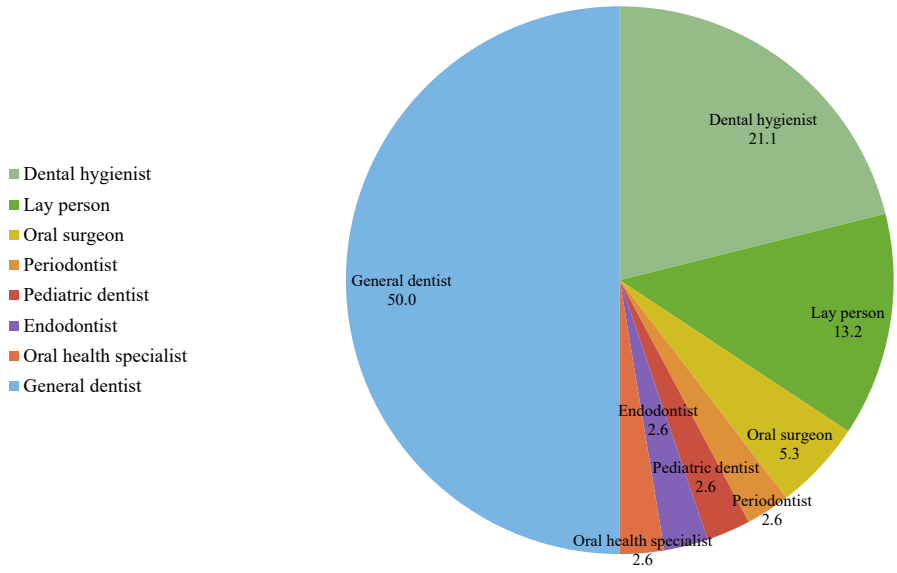

Figure 3 **Video sources (%).**

Full-size DOI: 10.7717/peerj.21937/fig-3

Table 4 **Distribution of videos according to global quality scale (GQS).**

Score	Global quality scale	n	%
1	Very low	3	7.90%
2	Low	11	28.90%
3	Moderate	16	42.10%
4	High	8	21.10%
5	Very high	0	0.00%

the selected videos were re-evaluated by the same observers one month after the initial assessment, and similarly high intra-rater reliability was observed (Kappa = 0.88–0.95). Of the users who uploaded the included videos, 86.8% ($n = 33$) were health professionals, whereas 13.2% ($n = 5$) were non-professionals (Fig. 3).

According to the Global Quality Scale (GQS) assessment presented in Table 4, 42.1% of the evaluated videos were classified as being of moderate quality. These videos provided some essential information but lacked sufficient depth in other areas, rendering them only partially useful for patient education. A total of 28.9% of the videos were categorized as low quality, and 7.9% as very low quality, offering minimal educational value for patients. While 21.1% of the videos were rated as high quality, none reached the highest quality category.

As shown in Table 5, the DISCERN-based evaluation revealed that the majority of videos were of low quality. Specifically, 52.6% of the videos were classified as poor quality,

Table 5 DISCERN score ranges and corresponding quality levels.

DISCERN score	Out of 100	Quality level	n	%
63–80	80% & above	Excellent	0	0.00%
51–62	65% to 79%	Good	0	0.00%
39–50	51% to 64%	Fair	17	44.70%
27–38	37% to 50%	Poor	20	52.60%
16–26	20% to 36%	Very poor	1	2.60%

Table 6 Descriptive analysis of the YouTube videos.

Variable	Mean ± SD	Median	Minimum	Maximum
DISCERN	37.02 ± 6.51	38.00	24.00	49.00
Content Analysis	4.05 ± 1.81	4.00	1.00	8.00
GQS	2.76 ± 0.88	3.00	1.00	4.00
VIQI	11.76 ± 2.31	12.00	7.00	16
VIQI-1	2.94 ± 0.76	3.00	1.00	4.00
VIQI-2	3.02 ± 0.88	3.00	1.00	4.00
VIQI-3	2.36 ± 0.78	2.00	1.00	4.00
VIQI-4	3.42 ± 0.59	3.00	2.00	4.00
Video characteristics				
View count	216,614.26 ± 639,266.38	17,562	1	3102,250
Comment count	380.97 ± 964.10	58	0	5,000
Like count	5,450.52 ± 16,025.75	358	0	84,769
Dislike count	131.60 ± 350.88	17	0	1,789
Video duration (seconds)	331.13 ± 225.90	286	43	1,069
Time Since Upload (Days)	787.66 ± 721.94	649.5	1	1,961
Interaction Index	4.71 ± 9.16	2.025	0	39.09
View Rate	43,489.61 ± 85,727.34	7,751.155	20.59	292,636.9

Notes.
SD, standard deviation; VIQI, Video Information and Quality Index; GQS, Global Quality Score.

while 44.7% fell into the moderate-quality category. In contrast, no videos were identified as being of good or excellent quality. Only a single video (2.6%) was rated as very poor.

As presented in Table 6, the content evaluation scores and descriptive statistics related to the characteristics of the included YouTube videos are summarized. The mean DISCERN score—a key indicator of content quality—was 37.02 ± 6.51, with scores ranging from 24 to 49. The mean content analysis score was 4.05 ±1.81. The mean GQS score was 2.76 ± 0.88, indicating that the overall quality was below average. The total VIQI mean score was calculated as 11.76 ± 2.31. Among the subcomponents of VIQI, the highest mean score was observed for VIQI-4 (3.42 ± 0.59), whereas the lowest mean score was recorded for VIQI-3 (2.36 ± 0.78).

As presented in Table 7, a comparison of high-content and low-content YouTube videos with respect to quality metrics and video characteristics revealed several significant differences. High-content videos demonstrated significantly higher DISCERN (43.63 ± 3.74) and GQS (3.63 ± 0.52) scores compared with low-content videos

Table 7 Comparison of variables between high-content and low-content videos.

	Low-content videos ($n = 30$)				High-content videos ($n = 8$)				
Variable	**Mean**	**SD**	**Minimum**	**Maximum**	**Mean**	**SD**	**Minimum**	**Maximum**	***P***
DISCERN	35.27	5.96	24	47	43.63	3.74	39	49	**0.001*****
GQS	2.53	0.82	1	4	3.63	0.52	3	4	**0.001*****
VIQI-1	2.83	0.79	1	4	3.38	0.52	3	4	0.07
VIQI-2	2.97	0.89	1	4	3.25	0.89	2	4	0.427
VIQI-3	2.23	0.73	1	4	2.88	0.83	2	4	0.058
VIQI-4	3.33	0.61	2	4	3.75	0.46	3	4	0.076
VIQI	11.37	2.34	7	16	13.25	1.58	11	15	**0.033***
Video characteristics									
Comment count	151.4	306.45	0	1,576	1,241.88	1,857.71	4	5,000	0.133
View count	65,670.63	132,847.81	1	554,243	782,652.87	1274,023.5	2,023	3102,250	0.07
Like count	1,948.57	4,947.09	0	25,157	18,582.88	31,724.71	21	84,769	0.058
Dislike count	59	112.78	0	489	403.87	700.55	0	1,789	0.406
Video duration (seconds)	276.8	166.29	43	654	534.88	308.37	128	1,069	**0.016***
Time since upload (days)	1,234.77	806.54	1	1,961	877.5	347.57	434	1,281	0.671
Interaction index	3.24	7.30	0	39.09	2.35	1.26	0.94	4.71	0.185
View rate	5,457.14	8,908.74	17.24	36,753.51	88,221.06	117,110.61	66.90	292,636.88	0.053

Notes.

SD, Standard Deviation; VIQI, Video Information and Quality Index; GQS, Global Quality Score.

$^{*}p < 0.05$.

$^{**}p < 0.01$.

$^{***}p < 0.001$.

Bold values indicate statistical significance ($p < 0.05$).

(35.27 ± 5.96 and 2.53 ± 0.82, respectively) ($p = 0.001$). Similarly, the total VIQI score was significantly higher in high-content videos (13.25 ± 1.58) than in low-content videos (11.37 ± 2.34) ($p < 0.05$). Regarding video characteristics, the duration of high-content videos (534.88 ± 308.37 s) was significantly longer than that of low-content videos (276.8 ± 166.29 s) ($p < 0.05$). However, no statistically significant differences were observed between the two groups in terms of the number of comments, view counts, view ratio, likes, dislikes, upload duration, or interaction index ($p > 0.05$).

Table 8 presents the Pearson correlation coefficients between total content scores, GQS, VIQI, and various YouTube demographic parameters. Significant and moderate-to-high correlations were observed between VIQI and GQS ($r = 0.751$), VIQI and DISCERN ($r = 0.785$), and VIQI and Content Analysis ($r = 0.594$) ($p < 0.001$). Similarly, strong positive correlations were found between GQS and DISCERN ($r = 0.842$), GQS and Content Analysis ($r = 0.716$), and DISCERN and Content Analysis ($r = 0.743$), all of which were statistically significant ($p < 0.001$). In contrast, no significant correlations were identified between quality scores and YouTube engagement metrics such as view count, comment count, like count, dislike count, interaction index, and view rate, as correlation values were generally below 0.1 and p-values exceeded 0.05. However, weak-to-moderate correlations were observed between content analysis and view count ($r = 0.333$, $p < 0.05$), comment count ($r = 0.385$, $p < 0.05$), like count ($r = 0.366$, $p < 0.05$),

Table 8 Pearson correlation coefficients scores between total content score, GQS, VIQI, and YouTube demographics.

	VIQI	GQS	Content analysis	DISCERN	View count	Comment count	Like count	Dislike count	Video duration (seconds)	Time since upload (days)	Interaction index	View rate
VIQI	1	0.751†	0.594†	0.785†	0.062	0.1	0.082	0.018	0.475*	−0.157	−0.159	0.146
GQS	0.751†	1	0.716†	0.842†	0.187	0.299	0.286	0.216	0.599†	0.215	0.213	0.258
Content analysis	0.594†	0.716†	1	0.743†	0.333*	0.385*	0.366*	0.32	0.579†	−0.275	0.089	0.397*
DISCERN	0.785†	0.842†	0.743†	1	0.26	0.301	0.289	0.277	0.553†	−0.209	0.129	0.304

Notes.
VIQI, Video Information and Quality Index; GQS, Global Quality Score.
*$p < 0.05$.
† $p < 0.001$.

and view rate ($r = 0.397$, $p < 0.05$). No such associations were found for GQS, VIQI, or DISCERN scores. Video Duration demonstrated significant correlations with VIQI ($r = 0.475$, $p < 0.05$), GQS ($r = 0.599$, $p < 0.001$), content analysis ($r = 0.579$, $p < 0.001$), and DISCERN ($r = 0.553$, $p < 0.001$)

Table 9 demonstrates that there were no statistically significant differences in content quality—assessed through DISCERN, GQS, VIQI, and content analysis scores—between videos uploaded by professional users and those uploaded by laypersons ($p > 0.05$). However, significant differences were observed in viewer engagement metrics. Videos uploaded by laypersons received significantly higher numbers of views, likes, comments, and dislikes compared with those uploaded by professionals ($p < 0.05$).

DISCUSSION

Maintaining good oral health is widely recognized as a fundamental prerequisite for achieving overall well-being (*Seymour, 2007*). Similar to many other areas of daily life, individuals increasingly rely on social networks and the internet—particularly YouTube—due to their ease of access to health-related information (*Wu, Li & Lin, 2024*). However, the presence of low-quality videos raises concerns, as inaccurate or misleading content may misinform users and potentially influence their health-related decisions negatively (*Mohamed & Shoufan, 2024*). To the best of our knowledge, this is the first study to examine and analyze the content of YouTube videos related to toothpaste.

The literature indicates that users typically review only the first three pages of search results and watch approximately 200 videos when seeking information (*Aksoy & Topsakal, 2022*; *Fox & Duggan, 2013*). In line with these findings, the first 325 videos retrieved across the two search terms were screened in the present study, of which 38 met all eligibility criteria and were included in the final analysis.

In the present study, the total number of views for videos related specifically to toothpastes was 8,225,342, whereas videos focusing on oral hygiene practices accumulated 58,278,919 views (*Kuka & Gursoy, 2024*). This substantial discrepancy may be attributable to the relatively limited number of toothpaste-focused videos available on YouTube, as well as users' greater interest in content addressing directly applicable oral hygiene practices such as toothbrushing and flossing.

Table 9 Distribution of analyses based on the source of the videos.

Variable	Group		Mann Whitney U Test	
	Professional Mean ± SD	Lay Person Mean ± SD		
			Z	*P*
DISCERN	37.00 ± 6.52	37.20 ± 7.19	−0.108	0.914
Content analysis	4.03 ± 1.72	4.20 ± 2.58	−0.263	0.792
GQS	2.72 ± 0.87	3.00 ± 1.00	−0.549	0.583
VIQI-1	3.00 ± 0.79	2.60 ± 0.54	−1.358	0.175
VIQI-2	3.12 ± 0.81	2.40 ± 1.14	−1.484	0.138
VIQI-3	2.36 ± 0.74	2.40 ± 1.14	−0.024	0.981
VIQI-4	3.42 ± 0.61	3.40 ± 0.54	−0.195	0.846
VIQI	11.90 ± 2.25	10.80 ± 2.77	−0.916	0.359
Video characteristics				
View count	353,489.46 ± 847,352.85	626,811.60 ± 1080,222.18	−2.051	**0.040***
Comment count	371.07 ± 812.15	1,654.40 ± 2,007.41	−2.400	**0.016***
Like count	5,734.61 ± 13,628.10	24,545.20 ± 35,131.55	−2.613	**0.009****
Dislike count	208.30 ± 487.16	401.60 ± 496.48	−2.486	**0.013***
Video duration (seconds)	343.38 ± 158.73	524.40 ± 408.24	−0.972	0.331
Time since upload (days)	699.07 ± 731.61	1,018 ± 719.39	−1.232	0.218
Interaction index	2.68 ± 3.75	10.01 ± 16.32	−1.331	0.183
View rate	28,328.55 ± 65,377.63	82,908.37 ± 125,387.24	−0.739	0.460

Notes.
SD, Standard Deviation; VIQI, Video Information and Quality Index; GQS, Global Quality Score; z, Mann Whitney U Test.
*$p < 0.05$.
**$p < 0.01$.
Bold values indicate statistical significance ($p < 0.05$).

Video quality in the present study was assessed using the GQS, DISCERN, and VIQI, in line with previous YouTube-based investigations in dentistry (*Kaval et al., 2022*; *Romano et al., 2021*), and these indices converged on a consistent picture. The GQS results showed that high-quality, comprehensive videos were scarce, while the DISCERN ratings indicated that the principal weakness of this content was its evidentiary basis rather than its general presentation, since most videos did not cite sources, acknowledge limitations, or present balanced information. The VIQI subcomponents showed a similar pattern, with video quality receiving the lowest score. Taken together with the low DISCERN reliability scores, which reflected limited impartiality and an absence of cited evidence, these results suggest that the content leaned toward subjective, promotional messaging rather than neutral, evidence-based information. From a patient-education perspective, this predominance of moderate-quality content is clinically meaningful, since such videos tend to provide partial information without sufficient depth on the key aspects of toothpaste use. Because patients often consult them without professional guidance, this incompleteness may contribute to inadequately informed decisions and indicates that the available content cannot serve as a stand-alone educational resource.

The content analysis pointed in the same direction, with most videos covering only a fraction of the clinically relevant topics on toothpaste. This indicates that the available

content tends to address isolated aspects rather than offering the comprehensive overview a viewer would need to make an informed choice. The pattern is consistent with previous YouTube-based studies on dental and public health topics, which have likewise reported limited content coverage and usefulness (*Bora et al., 2018*; *Dubey et al., 2015*; *Hegarty et al., 2017*; *Menziletoglu, Guler & Isik, 2020*).

In our study, a statistically significant difference was found between the high-content and low-content groups with respect to DISCERN, GQS, and total VIQI scores. This finding may be attributed to the fact that videos with richer content tend to exhibit more coherent narration, higher informational quality, and a more effective presentation style for viewers. However, no statistically significant differences were observed between the two groups in terms of view count, likes, dislikes, or number of comments. This indicates that, at the group level, more comprehensive videos did not attract greater engagement. Consistent with this, the formal quality indices (GQS, VIQI, and DISCERN) showed no significant correlation with engagement metrics, suggesting that popularity does not necessarily reflect the methodological quality of the videos. The content score itself was only weakly correlated with view count, indicating that comprehensiveness was, at most, marginally related to viewership.

When video duration was evaluated, videos in the high-content group were found to be significantly longer than those in the low-content group. This is a reasonable finding, as videos with higher content scores are more likely to include a broader range of topics and provide more detailed explanations related to toothpaste, thus requiring longer durations. Similarly, recent studies have demonstrated that videos with more comprehensive content tend to have longer durations (*Lena & Dindaroğlu, 2018*; *Simsek et al., 2020*). On the other hand, some research has emphasized that prolonged video duration may reduce viewer attention, highlighting the need to balance the depth of content with appropriate video length during video production (*Duman, 2020*; *Oz & Kirzioglu, 2021*; *Wu, Li & Lin, 2024*).

A positive correlation was identified among DISCERN, GQS, content scores, and the total VIQI scores. These findings indicate that as the overall video quality increases, all evaluation scales rise concurrently, demonstrating that the instruments consistently measure similar dimensions of quality. Moreover, these results align with the findings of previous studies (*Kaval et al., 2022*; *Zincir, Bozkurt & Gaş, 2019*).

In the present study, the majority of YouTube videos related to toothpastes were uploaded by oral health care professionals. Notably, however, no significant differences were observed between professional and non-professional uploaders in terms of content richness and quality scores. This finding aligns with previous studies evaluating oral hygiene–related videos, which similarly reported no meaningful differences in the quality of content produced by professionals *versus* laypersons (*Kuka & Gursoy, 2024*; *Oz & Kirzioglu, 2021*). In contrast, studies assessing videos on more specialized or clinically complex topics have demonstrated that videos uploaded by professionals tend to exhibit higher accuracy and superior informational quality (*Kaval et al., 2022*; *Kuru & Erken, 2020*). In addition, videos uploaded by laypersons attracted higher levels of engagement, including more views, comments, likes, and dislikes. Several factors may explain this greater engagement of lay videos despite their lack of a quality advantage.

Non-professional creators often adopt a more relatable and less technical communication style, which may resonate more readily with general viewers. Audience preferences appear to reinforce this pattern, as viewers tend to favour accessible content over more rigorous material and may be unable to distinguish reliable from biased information (*Ramadhani et al., 2021*). A comparable disconnect has been reported for other dental topics, where layperson videos achieved higher viewer interaction even though the overall content remained limited regardless of the uploader (*Jung & Seo, 2022*). It is also possible that the established evaluation tools (DISCERN, GQS, and VIQI) do not capture the production and narrative features that drive engagement, such as storytelling, pacing, and visual style, which may partly explain the dissociation between quality scores and viewer interaction.

These findings carry practical implications for both clinicians and public health communication. Since higher engagement was associated with lay content rather than with professional or higher-quality videos, simply producing accurate material is unlikely to be sufficient if it does not also reach and retain viewers. Dental professionals may therefore need to combine evidence-based content with clearer, more accessible, and more engaging presentation formats so that reliable information can compete for attention on the platform. At a broader level, professional organizations and public health institutions could play a coordinating role by developing standardized, evidence-based video resources, promoting them through recognized channels, and encouraging clinicians to direct patients toward vetted content. Embedding such material within wider oral health literacy efforts may help counterbalance the incomplete or commercially oriented information that currently dominates this topic.

Several limitations should be acknowledged in the present study. Given the highly dynamic nature of YouTube, the addition of new videos or the removal of existing ones after the analysis period may lead to minor variations in the findings. Moreover, the inclusion of only English-language videos may have resulted in the exclusion of potentially useful content presented in other languages. Another limitation concerns the exclusion of videos longer than 15 min; although applied to standardise the dataset, this criterion may have omitted some longer yet comprehensive content. In addition, the search was based on the two most frequently searched Google Trends queries (''toothpaste'' and ''best toothpaste''); more specific terms, such as ''fluoride toothpaste'', ''whitening toothpaste'' or ''sensitivity toothpaste'' were not included. Although the generic term ''toothpaste'' conceptually encompasses these formulations, YouTube's relevance-based ranking returns query-specific results, and as only the first 200 results per term were screened, content optimized for more specific queries may have been underrepresented. To minimize this limitation, Google Trends data were used to identify the search terms most frequently used by viewers; nevertheless, the restricted search vocabulary may have introduced a degree of selection bias and should be considered when interpreting the findings. A further limitation is that YouTube's default ''relevance'' sorting personalizes results according to user profile, location, and search timing; consequently, the dataset may not be fully reproducible if the search is repeated under different conditions. To reduce this variability, all searches were conducted on a single day using a newly created account with cleared browsing history and cookies. Furthermore, the content

checklist used in this study was developed by the authors based on expert opinion and current evidence rather than being a formally validated instrument. Accordingly, our primary inferences regarding video quality and reliability were based on the established, validated tools (DISCERN, GQS, and VIQI), with the content checklist serving as a complementary descriptive measure of content comprehensiveness. With regard to the content assessment, although fluoride was included as a scored item in the checklist given its central role in caries prevention, we did not separately quantify the extent to which the videos distinguished between fluoridated and non-fluoridated toothpastes or which was emphasised; a dedicated assessment of fluoride-related messaging would be a valuable direction for future research. The evaluators were also not blinded to the video source, as uploader and channel information are inherent to the YouTube interface; this potential bias was mitigated by independent assessment and high inter- and intra-rater agreement. Finally, although VIQI-2 provides a global expert rating of perceived information accuracy, the factual accuracy of the videos was not verified systematically: individual statements were not checked against clinical guidelines or a predefined reference standard. Our findings should therefore be interpreted as reflecting information quality, reliability, and comprehensiveness rather than confirmed factual correctness, and a statement-level accuracy audit against current evidence-based guidelines represents an important direction for future research.

CONCLUSIONS

According to the findings of this study, a substantial proportion of YouTube videos related to toothpastes were classified as having low or moderate usefulness, with several essential content elements missing regardless of the uploader type. Videos with limited or incomplete content may contribute to gaps in public understanding regarding toothpaste selection and oral hygiene practices. Therefore, universities and professional organizations should take a more active role in producing high-quality YouTube content, ensuring that such content is accessible and engaging enough to reach the public effectively, and regularly evaluating existing videos in terms of their reliability and informational quality. In line with these findings, further research is warranted to systematically assess toothpaste-related video content across other social media platforms.

Instrument licensing

The DISCERN instrument (*Charnock et al., 1999*) may be reproduced without separate permission provided it is applied in accordance with the instructions published by its developers; this is stated on the official DISCERN pages hosted by the Nuffield Department of Population Health, University of Oxford (https://www.ndph.ox.ac.uk/research/research-groups/applied-health-research-unit-ahru/discern/the-discern-questionnaire, accessed 5 August 2026), and the instrument was applied accordingly in this study. ©The British Library and the University of Oxford 1997. The DISCERN scoring bands presented in Table 3 are adapted from *Tahir et al. (2020)*, published under a Creative Commons Attribution 4.0 International License (https://doi.org/10.3390/app10093214), which permits adaptation and reproduction with appropriate attribution. The Video

Information and Quality Index was originally published in an open-access article distributed under the Creative Commons Attribution 4.0 International License (*Nagpal et al., 2015*; https://doi.org/10.1186/s40064-015-1251-9), which permits reproduction in any medium with appropriate attribution; it is therefore used under that published license. The Global Quality Score (*Bernard et al., 2007*) was applied as described in the original publication; no part of that publication is reproduced here. The 10-item content checklist was developed by the authors for the purposes of this study and is not derived from a copyrighted instrument.

ACKNOWLEDGEMENTS

ChatGPT (GPT-5.2; OpenAI) was employed exclusively for language editing and grammatical refinement of the manuscript. The AI tool was not used for content generation, data analysis, or any other purpose. All changes were reviewed and approved by the authors.

ADDITIONAL INFORMATION AND DECLARATIONS

Funding

The authors received no funding for this work.

Competing Interests

The authors declare there are no competing interests.

Author Contributions

- Mehmetcan Uytun conceived and designed the experiments, performed the experiments, analyzed the data, prepared figures and/or tables, authored or reviewed drafts of the article, and approved the final draft.
- Ali Batuhan Bayırlı conceived and designed the experiments, performed the experiments, analyzed the data, authored or reviewed drafts of the article, and approved the final draft.
- Yavuz Selim Genç conceived and designed the experiments, performed the experiments, prepared figures and/or tables, authored or reviewed drafts of the article, and approved the final draft.
- Ruşen Erdem analyzed the data, prepared figures and/or tables, authored or reviewed drafts of the article, and approved the final draft.
- Ahmet Yıldırım conceived and designed the experiments, performed the experiments, analyzed the data, authored or reviewed drafts of the article, and approved the final draft.
- Aybüke Asena Atasever İşler analyzed the data, prepared figures and/or tables, authored or reviewed drafts of the article, and approved the final draft.

Data Availability

The following information was supplied regarding data availability:

The data is available in the Supplemental Files.

Supplemental Information

Supplemental information for this article can be found online at http://dx.doi.org/10.7717/peerj.21937#supplemental-information.

REFERENCES

Abukaraky A, Hamdan AA, Ameera M-N, Nasief M, Hassona Y. 2018. Quality of YouTube TM videos on dental implants. *Medicina Oral, Patologia Oral y Cirugia Bucal* **23(4)**:e463–e468 DOI 10.4317/medoral.22447.

Aksoy M, Topsakal KG. 2022. YouTube™ for information on paediatric oral health instructions. *International Journal of Dental Hygiene* **20**:496–503 DOI 10.1111/idh.12580.

Albayrak E, Büyükçavuş MH. 2023. Does YouTube offer high-quality ınformation? Evaluation of patient experience videos after orthognathic surgery. *The Angle Orthodontist* **93**:409–416 DOI 10.2319/042522-315.1.

Basch CH, Blankenship EB, Goff ME, Yin J, Basch CE, De Leon AJ, Fung IC-H. 2018. Fluoride-related YouTube videos: a cross-sectional study of video contents by upload sources. *Journal of Dental Hygiene* **92(6)**:47–53.

Bernard A, Langille M, Hughes S, Rose C, Leddin D, Van Zanten SV. 2007. A systematic review of patient inflammatory bowel disease information resources on the World Wide Web. *American Journal of Gastroenterology* **102(9)**:2070–2077 DOI 10.1111/j.1572-0241.2007.01325.x.

Bezner SK, Hodgman EI, Diesen DL, Clayton JT, Minkes RK, Langer JC, Chen LE. 2014. Pediatric surgery on YouTube™: is the truth out there? *Journal of Pediatric Surgery* **49**:586–589 DOI 10.1016/j.jpedsurg.2013.08.004.

Bora K, Das D, Barman B, Borah P. 2018. Are internet videos useful sources of information during global public health emergencies? A case study of YouTube videos during the 2015–16 Zika virus pandemic. *Pathogens and Global Health* **112**:320–328 DOI 10.1080/20477724.2018.1507784.

Charnock D, Shepperd S, Needham G, Gann R. 1999. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *Journal of Epidemiology & Community Health* **53(2)**:105–111 DOI 10.1136/jech.53.2.105.

Chu JT, Wang MP, Shen C, Viswanath K, Lam TH, Chan SSC. 2017. How, when and why people seek health information online: qualitative study in Hong Kong. *Interactive Journal of Medical Research* **6(2)**:e24 DOI 10.2196/ijmr.7000.

Cota LOM, Villar CC, Vettore MV, Campos JR, Gclsd AMARAL, Cortelli JR, Cortelli SC. 2021. Periodontal diseases: is it possible to prevent them? A populational and individual approach. *Brazilian Oral Research* **35**:e098 DOI 10.1590/1807-3107bor-2021.vol35.0098.

Duman C. 2020. YouTube™ quality as a source for parent education about the oral hygiene of children. *International Journal of Dental Hygiene* **18(3)**:261–267 DOI 10.1111/idh.12445.

Desai T, Shariff A, Dhingra V, Minhas D, Eure M, Kats M. 2013. Is content really king? An objective analysis of the public's response to medical videos on YouTube. *PLOS ONE* **8**:e82469 DOI 10.1371/journal.pone.0082469.

Dubey D, Amritphale A, Sawhney A, Dubey D, Srivastav N. 2015. Analysis of YouTube as a source of information for West Nile virus infection. *Clinical Medicine & Research* **12(3–4)**:129–132 DOI 10.3121/cmr.2013.1194.

Eurobarometer F. 2014. European citizens' digital health literacy. A report to the European Commission 162.

Fox S, Duggan M. 2013. Health Online 2013. Part One: Information Triage. Washington, DC: Pew Research Center's Internet & American Life Project. *Available at https://www.pewresearch.org/internet/2013/01/15/information-triage/* (accessed January 2026).

Hassona Y, Taimeh D, Marahleh A, Scully C. 2016. YouTube as a source of information on mouth (oral) cancer. *Oral Diseases* **22**:202–208 DOI 10.1111/odi.12434.

Hegarty E, Campbell C, Grammatopoulos E, Di Biase AT, Sherriff M, Cobourne MT. 2017. YouTube™ as an information resource for orthognathic surgery. *Journal of Orthodontics* **44**:90–96 DOI 10.1080/14653125.2017.1319010.

Jain N, Dutt U, Radenkov I, Jain S. 2024. WHO's global oral health status report 2022: actions, discussion and implementation. Wiley Online Library 73–79.

Jepsen S, Blanco J, Buchalla W, Carvalho JC, Dietrich T, Dörfer C, Eaton KA, Figuero E, Frencken JE, Graziani F. 2017. Prevention and control of dental caries and periodontal diseases at individual and population level: consensus report of group 3 of joint EFP/ORCA workshop on the boundaries between caries and periodontal diseases. *Journal of Clinical Periodontology* **44(Suppl 18)**:S85–S93 DOI 10.1111/jcpe.12687.

Jung MJ, Seo MS. 2022. Assessment of reliability and information quality of YouTube videos about root canal treatment after 2016. *BMC Oral Health* **22(1)**:494 DOI 10.1186/s12903-022-02540-4.

Kaval ME, Demirci GK, Atesci AA, Sarsar F, Dindaroğlu F, Güneri P, Caliskan MK. 2022. YouTube™ as an information source for regenerative endodontic treatment procedures: quality and content analysis. *International Journal of Medical Informatics* **161**:104732 DOI 10.1016/j.ijmedinf.2022.104732.

Kuka GI, Gursoy H. 2024. Content quality and reliablity of YouTube™ videos as a source of information about good oral hygiene practices in adults. *PeerJ* **12**:e18183 DOI 10.7717/peerj.18183.

Kuru T, Erken HY. 2020. Evaluation of the quality and reliability of YouTube videos on rotator cuff tears. *Cureus* **12(2)**:e6852 DOI 10.7759/cureus.6852.

Lena Y, Dindaroğlu F. 2018. Lingual orthodontic treatment: a YouTube™ video analysis. *The Angle Orthodontist* **88**:208–214 DOI 10.2319/090717-602.1.

Lippert F. 2013. An introduction to toothpaste-its purpose, history and ingredients. *Monographs in Oral Science* **23**:1–14 DOI 10.1159/000350456.

Loureiro JM, Chaves VCV, Risso PA, Magno MB, Maia LC, Pithon MdM. 2023. YouTube™ as a source of tooth avulsion information: a video analysis study. *Dental Traumatology* **39**:616–624 DOI 10.1111/edt.12873.

Menziletoglu D, Guler A, Isik B. 2020. Are YouTube videos related to dental implant useful for patient education? *Journal of Stomatology Oral and Maxillofacial Surgery* **121**:661–664 DOI 10.1016/j.jormas.2019.12.022.

Mohamed F, Shoufan A. 2024. Users' experience with health-related content on YouTube: an exploratory study. *BMC Public Health* **24**:86 DOI 10.1186/s12889-023-17585-5.

Nagpal SJS, Karimianpour A, Mukhija D, Mohan D, Brateanu A. 2015. YouTube videos as a source of medical information during the Ebola hemorrhagic fever epidemic. *SpringerPlus* **4**:457 DOI 10.1186/s40064-015-1251-9.

Organization WH. 2022. Global oral health status report: towards universal health coverage for oral health by 2030: World Health Organization.

Oz E, Kirzioglu Z. 2021. An analysis of YouTube videos on oral hygiene practices during coronavirus disease 2019 pandemic. *Journal of Global Oral Health* **4**:84–93 DOI 10.25259/JGOH_2_2021.

Ramadhani A, Zettira Z, Rachmawati YL, Hariyani N, Maharani DA. 2021. Quality and reliability of halitosis videos on YouTube as a source of information. *Dentistry Journal* **9**(**10**):120 DOI 10.3390/dj9100120.

Ramsey I, Corsini N, Peters MD, Eckert M. 2017. A rapid review of consumer health information needs and preferences. *Patient Education and Counseling* **100**:1634–1642 DOI 10.1016/j.pec.2017.04.005.

Romano A, Lauritano D, Fiori F, Di Petrillo M, Hasan I, Lucchese A, Serpico R, Di Stasio D. 2021. Cross-sectional study on the quality of oral lichen planus videos on YouTube™. *Journal of Oral Pathology & Medicine* **50**:220–228 DOI 10.1111/jop.13128.

Seymour G. 2007. Good oral health is essential for good general health: the oral–systemic connection. *Clinical Microbiology and Infection* **13**(**Suppl 4**):1–2 DOI 10.1111/j.1469-0691.2007.01797.x.

Simsek H, Buyuk SK, Cetinkaya E, Tural M, Koseoglu MS. 2020. How I whiten my teeth: YouTube™ as a patient information resource for teeth whitening. *BMC Oral Health* **20**:183 DOI 10.1186/s12903-020-01172-w.

Tahir M, Usman M, Muhammad F, Rehman Su, Khan I, Idrees M, Irfan M, Glowacz A. 2020. Evaluation of quality and readability of online health information on high blood pressure using DISCERN and Flesch-Kincaid tools. *Applied Sciences* **10**(**9**):3214 DOI 10.3390/app10093214.

Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. 2017. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: a call for global action. *Journal of Clinical Periodontology* **44**:456–462 DOI 10.1111/jcpe.12732.

Van der Weijden G, Hioe K. 2005. A systematic review of the effectiveness of self-performed mechanical plaque removal in adults with gingivitis using a manual

toothbrush. *Journal of Clinical Periodontology* **32**:214–228 DOI 10.1111/j.1600-051X.2005.00795.x.

Wu J, Li D, Lin M. 2024. YouTube as an information source for bleeding gums: a quantitative and qualitative analysis. *PLOS ONE* **19**:e0298597 DOI 10.1371/journal.pone.0298597.

Yalcin-ulker GM, Duygu G. 2023. Evaluation of YoutubeTM videos as a patient education source for postoperative care after tooth extraction. *Aydın Dental Journal* **9**(**3**):89–102 DOI 10.17932/IAU.DENTAL.2015.009/dental_v09i30010.

Zincir ÖÖ, Bozkurt AP, Gaş S. 2019. Potential patient education of YouTube videos related to wisdom tooth surgical removal. *Journal of Craniofacial Surgery* **30**:e481-e484 DOI 10.1097/SCS.0000000000005573.