

Analyzing biomimetic dentistry YouTube videos' quality and content

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Abstract

Aim: This study evaluated the quality and content of YouTube videos about biomimetic dentistry.

Methodology: A keyword search for "biomimetic dentistry" was conducted on YouTube. It used only publicly available Internet data from searching YouTube with the default filter "Biomimetic Dentistry" on April 3, 2023. Of the 200 examined videos, only 91 fit the inclusion criteria; those 91 videos underwent a content quality evaluation. The videos' viewing rates were determined after their demographic characteristics were assessed. The information quality index (VIQI) and the Global Quality Scale (GQS) were used to evaluate the video quality. For the statistical analysis, the Shapiro-Wilk, Kruskal-Wallis, Mann-Whitney U, Chi-square, and Fisher's exact tests were used.

Results: Most of the videos (n = 59) were labeled "low content," and healthcare practitioners uploaded the majority (91.2%) of them to YouTube. The most discussed subject was advantages and disadvantages (87.9%), followed by the definition of biomimetic dentistry (76.9%). The high-content video group's GQS and VIQI scores were significantly higher than low-content group. There was a statistically significant positive correlation between the VIQI and GQS ($p < 0.05$) ($p = 0,001$) and a positive correlation between the overall content, total VIQI, and total GQS scores.

Conclusion: The material in YouTube videos about biomimetic dentistry is insufficient for use as a patient information tool. Biomimetic dentistry-related YouTube videos' quality and content were typically poor. Health practitioners should be aware of the content of video-sharing platforms and take responsibility for enriching video content.

Keywords: YouTube, biomimetic dentistry, information quality index, global quality scale

Introduction

The word "biomimetics" comes from the Latin terms "bios" and "mimesis," which mean life and imitation, respectively. Biomimicry is an interdisciplinary field that uses fundamental science to mimic nature's best biological methods. Biomimicry is the emulation of the models, systems, and elements of nature for the purpose of solving complex human problems. Biomimetics artificially replicates natural processes and structures to produce similar products (1).

Dentistry still struggles to restore severely damaged teeth. Biomimetic dentistry (BD) is becoming more popular and useful because it uses art and science to restore damaged teeth. This ensures that the restoration's aesthetics, functionality, and structural integrity restoration are the same as the tooth. Materials developed using biomimetics restore natural teeth's biomechanical properties. This ensures that the restoration is indistinguishable from the original in terms of aesthetics, functionality, and structural integrity (2).

In traditional dentistry, dental components are extracted and replaced with rigid materials. These methods and materials reduce restorative durability and the tooth's structural tensile strength (3).

BD can change the world by repairing and replacing damaged hard and soft oral tissues. In dentistry, dentin, enamel and cement have similar mechanical, physical and optical properties each other.

Technological advances, particularly the internet and its popularity, have made information more accessible. The Internet allows collaborative content development and easy access to knowledge. Additionally, it can generate, store, disseminate, evaluate, analyze, and show data. The use of the Internet by all segments of the population to search for medical information has increased significantly due to its easy accessibility, patients' demands for more information and its lower cost than professional health counselling (4). Patients use the Internet for medical information, diagnosis, and treatment. Healthcare professionals and patients increasingly use the Internet to obtain health information.

YouTube and other video-sharing platforms are popular sources of health content for patients and healthcare professionals. Alexa.com reports 65,000 new YouTube videos and 100 million daily views every day. Globally, over two billion unique users view over one billion hours of video on YouTube every month (5). It also allows social interaction via comments.

Visualization helps students understand difficult facts during instruction. Students and lecturers use YouTube videos to learn (6).

YouTube is a vital healthcare resource. However, YouTube videos lack a defined evaluation procedure, so users may obtain false information. The content of the video cannot be recognized by viewers as true or false (7). Despite numerous studies on the reliability and accuracy of health videos on YouTube, there is a need to improve the quality of videos on YouTube (8). No

research into the usefulness of BD-related videos found on YouTube has been conducted. This study assessed the usefulness of YouTube videos on BD as an information source for professionals and laypersons by analyzing the quality of the information, content, and demographics.

Materials and Methods

An ethical committee exempted from an interventional ethics committee application this cross-sectional examination of YouTube-based video media because it used only publicly available Internet data from searching YouTube with the default filter "BD" on April 3, 2023.

YouTube search

English was used to search for "biomimetic dentistry." According to Google Trends website (Alphabet, CA, USA), "Biomimetic Dentistry" was the top searched word for global, current content. "Keywords" and "sort by relevance" options were used as default filters. BD was chosen over biomimetic restorative dentistry because of its similarity and larger scope. Before the search, the cookies and computer history were wiped to avoid user constraints.

In many studies evaluating the quality of videos on YouTube, it has been observed that the first 60-200 videos are used (9). The first 200 videos were thoroughly examined, and the available data were analyzed. The playlist videos were stored in case the search results changed.

Video selection and analyses

Y.E.H. and D.D. analyzed the videos to remove those that did not fit the inclusion criteria. All videos without audio, in languages other than English, that were duplicates, on different topics, or longer than 30 minutes were deleted. Videos were categorized by upload date, origin, duration, likes, dislikes, and comments. The viewing rates and interaction index show audience participation (9).

Two assessors independently evaluated the videos' definitions, indications, equipment, principles, advantages/disadvantages, complications, restoration satisfaction, manufacturing technique, protocols, clinical survival, psychological and physiological effect, comparison of conventional dentistry and BD, and restorations.

The content was each video received a point for each of 13 categories of information that they addressed. High-content videos scored 7-13 points, whereas low-content videos received 0-6 points. The researchers reconciled scores during video evaluation.

The participants were divided into five categories: healthcare providers (dentists and specialists), hospitals/universities, commercial agencies (dental manufacturing businesses), laypeople, and others

(independent non-medical users). The target population included professionals, nonprofessionals, and both.

The VIQI was used to evaluate video quality. The information flow, precision, and correctness of the videos were assessed using a 5-point Likert scale from 1 (poor) to 5 (high). The Global Quality Scale (GQS) was used to grade the instructional value of the videos (10). The GQS measured information flow, patient utility, and content quality on a 5-point scale, with higher scores implying better video quality (11, 12). After rewatching the videos that caused differences, the researchers reached a consensus.

Statistical analysis

The data were analyzed using IBM SPSS Statistics software for Windows (Ver. 22.0; IBM Corp., Armonk, NY, USA).

The Shapiro-Wilks test was used to determine the normality of the data distribution. Furthermore, the Kruskal-Wallis Test was applied for comparisons involving multiple quantitative data groups. To compare two quantitative data groups, the Mann-Whitney U Test was utilized. The Spearman's rho correlation analysis was employed to scrutinize relationships among parameters. The threshold for significance was established at $p < 0.05$. Chi-square analysis was used to compare categorical data, and Fisher's Exact test was applied when the expected value was below 5 in more than 25% of the values.

Results

Two hundred videos were reviewed in this study. Of these, 109 videos were excluded, Table 1 shows exclusion criteria and country origin (Table 1). Thus, 91 videos were included in the final analysis. The results showed that studies related to BD were uploaded to videos of more interest by the United States compared to other countries (Table 1).

The number of video views, video duration, and likes and dislikes did not differ substantially across the

low and high-content video groups ($p > 0.05$). The viewing rate and interaction index did not differ between the low and high video content groups ($p > 0.05$) (Table 2). The lengths of the high-content videos were much longer than those of the low-content videos ($p = 0.004$). The high-content videos also received many more comments ($p = 0.031$). The GQS scores of the high-content videos were higher than low-content videos ($p = 0.001$). In addition, the scores for information flow, quality of videos, and total VIQI of the high-content videos were considerably higher than low-content videos ($p = 0.001$).

The VIQI and total content scores showed a strong (70.8%) positive correlation ($p = 0.001$) (Table 3). There was also a positive correlation (71.9%) between the total content score and GQS ($p = 0.001$). There was a positive, moderately (46%) statistically significant correlation between the total content score and video duration ($p = 0.001$) ($r = 0.46$). There was a modest, positive (20.7%) statistically significant correlation between the total content score and comments ($p = 0.049$). The total content score was not correlated with the viewing rate or interaction index ($p > 0.05$). A strong correlation (78.1%) was found between the VIQI score and GQS ($p = 0.001$). A moderate correlation was found between the VIQI score and comment count ($p = 0.021$). In addition, there was a statistically significant correlation between the VIQI score and the number of likes ($p = 0.049$; $p < 0.05$). The VIQI score showed a positive correlation with the number of views, and this finding was moderately significant ($p = 0.041$). There was no statistically significant correlation between the VIQI score and other interaction index ($p > 0.05$).

There was a positive, moderate correlation between the GQS score and video duration (minutes) ($p = 0.045$) (Table 3). A strong correlation (22.4%) was found between the GQS score and viewing rate ($p = 0.033$). The GQS score was not correlated with the interaction index ($p > 0.05$). There was no significant difference in the total content, VIQI, and GQS scores according to the video upload source ($p > 0.05$). There was no significant difference in the total content, VIQI, and GQS scores of the target audience ($p > 0.05$).

Table 1. Exclusion criteria and country origin.

Country origin	n	%	Exclusion criteria	n	%
ABD	84	92.3	No audio	51	46.8
Indonesia	2	2.2	Not in English	8	7.3
Italy	2	2.2	Duplicate	17	15.6
Netherlands	1	1.1	Not related to subject	1	0.9
Philippines	1	1.1	Video duration 30 min	32	29.4
Spain	1	1.1	Total	109	100
Total	91	100.0			

Table 2. Comparison of variables low-content and high-content videos.

	Low Content			High Content			
Variables	Min	Max	Mean±SD (median)	Min	Max	Mean±SD (median)	p
Video characteristics							
Number of views	8	60920	3564.63±9487.52 (220)	5	102400	7751.06±20060.83 (758.5)	0.146
Duration in minutes	0.3	18.18	3.67±3.6 (2.4)	1.33	51	8.54±10.61 (3.4)	0.004*
Days since upload	35	4626	1502.92±1044.8 (1334)	25	4598	1617.5±1059.38 (1158)	0.822
Number of comments	0	123	3.12±16.07 (0)	0	166	12.84±33.27 (0)	0.031*
Number of likes	0	2100	59.24±273.76 (5)	0	1600	112.66±324.51 (5.5)	0.402
Number of dislikes	0	9	0.17±1.18 (0)	0	0	0±0 (0)	0.295
Viewing rate	0.74	8280.25	370.27±1168.68 (30.9)	0.82	11022.6	721.49±2126.2 (47.4)	0.238
Interaction Index	0	123.08	6.92±20.83 (1.2)	0	5.13	1.36±1.29 (1)	0.572
GQS	1	5	2.15±0.81 (2)	2	5	4.38±0.83 (5)	0.001*
VIQI content assessment							
Flow of information	1	5	2±1 (2)	1	5	4.28±0.92 (4)	0.001*
Information accuracy	1	5	2±0.91 (2)	1	5	4.34±0.97 (5)	0.001*
Quality	1	5	1.97±0.95 (2)	2	5	4.13±0.94 (4)	0.001*
Precision	1	5	2±0.96 (2)	1	5	4.22±1.04 (4.5)	0.001*
VIQI total score	4	20	7.97±3.33 (7)	6	20	16.97±3.04 (18)	0.001*

Mann Whitney U Test

* $p < 0.05$ **Table 3.** Correlations between total content score, VIQI, GQS, and YouTube demographics.

		Total Content Score	VIQI	GQS
Total Content Score	r	1		
	p	.		
VIQI	r	0.708	1	
	p	0.001*	.	
GQS	r	0.719	0.781	1
	p	0.001*	0.001*	.
Number of views	r	0.189	0.184	0.169
	p	0.073	0.081	0.109
Duration in minutes	r	0.460	0.141	0.211
	p	0.001*	0.181	0.045*
Days since upload	r	0.067	-0.096	-0.092
	p	0.526	0.366	0.384
Number of comments	r	0.207	0.241	0.181
	p	0.049*	0.021*	0.087
Number of likes	r	0.156	0.206	0.152
	p	0.141	0.049*	0.149
Number of dislikes	r	0.006	-0.102	-0.030
	p	0.954	0.336	0.775
Viewing rate	r	0.132	0.215	0.224
	p	0.211	0.041*	0.033*
Interaction Index	r	0.002	0.063	0.044
	p	0.982	0.555	0.678

Spearman's Rho Correlations

* $p < 0.05$

Discussion

People are increasingly relying on YouTube videos to enhance their understanding of medical illnesses and treatments with the aim of making informed healthcare choices (13). The disparity between the quality of the information in these videos and the prevalence of their use by dental patients indicates a need for dental professionals to be aware of the amount of misleading information disseminated on the Internet regarding dental care. Although YouTube has been evaluated as an important source of information, containing videos related to all branches of dentistry, this is probably the first study to evaluate YouTube content related to BD, which has become well-known and important (14-16). Our findings demonstrate that YouTube is not a reliable source of information about BD. The videos included in the study were viewed by a total of 500,000.

For this study, two observers watched, analyzed, and interpreted the videos. The videos were divided into categories based on the overall scores of the quality of their content. High-content videos were scarce. Therefore, the patient information videos in this study were of low-content and quality. This is in agreement with other studies showing that the content quality of YouTube videos is low (17).

In recent years, YouTube videos in non-English languages have also been growing in popularity (18). However, as the number of non-English BD-related videos was small, only videos in English were included in our analysis.

The United States was most frequently identified as the origin of a video. This indicates that interest in BD is

greatest in the United States than in other nations. According to our assessment, none of the videos covered all the themes. The pros, cons, definition, comparison, principles, and indicators of BD were the most common video topics. Because 91.2% of the videos in this study were posted by healthcare practitioners. The findings also revealed the target audience of these videos, which was made up of people interested in learning about the pros of BD. The least-discussed subject was complications of BD. This may be because there are few retrospective BD studies, so the complications of BD may receive little attention.

There was no statistical difference between the origins of low- and high-quality content video uploads. Similar research concluded that the source of a video had no bearing on its quality. In contrast, another study found that dental professionals produced videos of superior quality (19).

The number of video views, the length of time since the video was uploaded, the number of likes and dislikes, the viewing rate, and the interaction index did not substantially differ between the low- and high-content video groups. These criteria may exhibit variability due to the intricate dynamics between adverts and the user base on social media platforms.

The mean duration of the videos in the study was 5.38 minutes. In prior studies analyzing YouTube videos, the average video length ranged from 2.87 to 7.40 minutes (8, 20, 21). This supports the proposition that excessive video length causes viewers to lose interest. Moreover, the length of videos with high-content was found to be substantially longer than that of videos with low-content. This suggests that providing as much information as possible within a reasonable time frame is an effective approach to disseminate information about BD.

The videos with high-content received significantly more comments than those with low-content. Therefore, it can be hypothesized that videos with high-content encourage more user interaction by providing more quality content.

The total VIQI score of the high-content video group was also higher. The qualitative analysis also revealed video quality, flow, accuracy, and total quality to be greater in this group. GQS and VIQI scores correlated strongly with total content. Previous research supports these findings (22, 23). However, one study found that the total VIQI score did not differ between high and low-content video groups (24). Information flow, accuracy, and the choice of titles can also be used to improve videos quality. Viewers benefit from videos with diverse and accurate content, which explains the association between overall content quality and GQS scores. YouTube users correlated VIQI and total content scores. VIQI score and GQS score correlated strongly, indicating that the study's classification systems agreed. Again, the superior GQS scores found in this study, as opposed to other studies, may be because most of the uploaded videos were created by medical professionals.

Some prior studies involving YouTube have used modified versions of the DISCERN and MICI (18, 25). The

DISCERN evaluates the quality of health information, while the MICI assesses the content of medical videos for prevalence, symptoms, transmission, examination, and therapy. While the other indices measure the quality of the information provided in videos, the VIQI measures video quality in a broader sense. In this research, we evaluated dental videos using the VIQI to assess flow, information, quality, and precision.

In the present study, the prospect that improved technology, and better visual effects will pave the way for the emergence of higher-quality BD video content soon was disregarded.

Owing to the dynamism of Internet content, the findings of this study, like those of other qualitative research, involve time-sensitive information. Video statistics, such as the number of views and the ratio of likes to dislikes, evolve quickly. Furthermore, our analysis was limited to the first 200 films retrieved from a search of YouTube videos pertaining to BD. Therefore, some of our findings cannot be compared with those of similar studies. It is imperative to acknowledge these limitations in forthcoming studies pertaining to the quantification and viewership of YouTube videos related to BD.

Conclusion

This study is the first to examine how YouTube videos spread BD information. This study assessed the quality of the content of BD-related YouTube videos. Analysis of quantifiable data, including video length, source category, and audience sentiments, was the secondary purpose. It was found that viewers were more likely to trust videos created by medical professionals. Thus, to aid in the provision of reliable and high-quality information to the intended audience, health practitioners should be encouraged to publish videos on video-sharing sites. In addition, the study found the quality of the information provided by YouTube videos to be unsatisfactory, and healthcare practitioners are advised to actively assess the quality of the health information being consumed by their patients.

Disclosures

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