Original Article

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Dentistry Section

Quality and Content Analysis of YouTube Videos Regarding Antibiotic use in Dentistry: A Cross-sectional Study

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ABSTRACT

Introduction: Antibiotic misuse is a major global public health problem that contributes to antimicrobial resistance. India is among the largest consumers of antibiotics worldwide.YouTube, widely used for accessing health-related information, hosts content on antibiotic use that includes misinformation, which may mislead patients who bypass professional consultations. Despite the growing use of YouTube as a source of health information, limited evidence exists about the accuracy and reliability of content related to antibiotics in dentistry.

Aim: To assess YouTube videos related to the use of antibiotics in dentistry for their content and overall quality, including clarity, accuracy, technical quality, overall flow, completeness of information, and usefulness to patients.

Materials and Methods: This was a cross-sectional study conducted via YouTube between January 2024 and March 2024 at the Department of Oral Medicine and Radiology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India. Of the 300 videos initially identified across all predefined search terms, 29 met the primary inclusion criteria: English-language videos related to the study topic, with clear audio-visual quality and relevant educational content. Video demographics, source, length, and viewer interaction indices were recorded. Content analysis was performed using a 10-point rating system. The Global Quality Scale (GQS) and Video Information and Quality Index (VIQI) were applied to assess the overall quality of the videos. Statistical analysis was performed using descriptive and inferential statistics, including the Mann–Whitney U test, Spearman's rank correlation, Cohen's kappa, and intraclass correlation coefficient (ICC), as appropriate. A p-value <0.05 was considered statistically significant.

Results: The mean content score was 3.51±2.13 out of 10, (p=0.0004) between rich and poor content videos, while the mean GQS value was 2.64/5 (p=0.0203), showing statistical significance. VIQI scores averaged 10.08/20, with no significant differences (p=0.853). Among the 29 videos analysed, the major contributors were general channels (n=11; 37.93%), followed by health care professionals (27.59%), educational series 5 (17.24%), and health care centres 4 (13.79%). Only one video (3.45%) was uploaded by a dental association (such as the American Dental Association). Regarding geographic origin, the majority were uploaded from India, 8 (28%) and from the USA 7 (24%), while the remaining videos were from other countries.

Conclusion: YouTube videos on antibiotics in dentistry generally exhibited poor content and moderate quality. Addressing antimicrobial resistance requires responsible prescription practices and patient education on appropriate antibiotic use.

Keywords: Health literacy, Information dissemination, Patient education, Public health, Social media

INTRODUCTION

A major worldwide concern is antibiotic resistance, which occurs when bacteria develop resistance to antibiotics, decreasing the effectiveness of treatments. Antibiotic misuse and overuse hasten the emergence of resistant strains, which puts significant pressure on healthcare systems and results in longer disease durations and increased mortality rates. Responsible antibiotic use, development of new treatments, and global cooperation are essential to combat this issue. Self-medication worsens resistance by promoting inappropriate use and incomplete treatment [1].

Social media plays a dual role in antibiotic usage. It can disseminate valuable health information but also spreads misinformation, encouraging self-prescription and undermining professional advice. Social media presents issues including privacy hazards and mental health issues despite its educational potential, highlighting the necessity of careful digital use [2].

Global antibiotic consumption increased by 36% between 2000 and 2010, with the BRICS countries, namely Brazil, Russia, India, China, and South Africa, contributing nearly 76% of this rise [3]. India faces particular challenges due to widespread self-medication and easy access to over-the-counter antibiotics [4]. Annually, 56,524 neonatal deaths in India are linked to sepsis from bacteria resistant to first-line antibiotics [5]. In 2010, India recorded the world's highest antibiotic consumption in human medicine [6].

Antibiotic use in dentistry is widespread in India [7], with studies reporting incorrect prescription practices among dental professionals [8,9]. Poor dentist-to-population ratios [10] and uneven workforce distribution [11] lead rural populations to seek Informal Healthcare Providers (IHCPs) [12]. A study found 90% of dental-related prescriptions by IHCPs included antibiotics [9]. YouTube is increasingly used for health information [13,14], but users often struggle to assess content accuracy [15,16]. Although existing literature has reported antibiotic misuse and resistance, limited research has evaluated the accuracy and quality of online content, particularly on widely accessed platforms like YouTube. The present study is novel in assessing how YouTube videos portray antibiotic use in dentistry, bridging the gap between digital health communication and antibiotic stewardship. By critically analysing video content, the study highlights both the potential and the risks of social media as a tool for public health education, offering insights for healthcare professionals, policymakers, and educators to strengthen digital strategies against antibiotic misuse. This study aimed to evaluate the YouTube videos related to antibiotic use in dentistry in terms of clarity, accuracy, technical quality, overall flow, completeness of information, and usefulness

to patients, with a focus on promoting appropriate usage and creating awareness about the risks of misuse.

MATERIALS AND METHODS

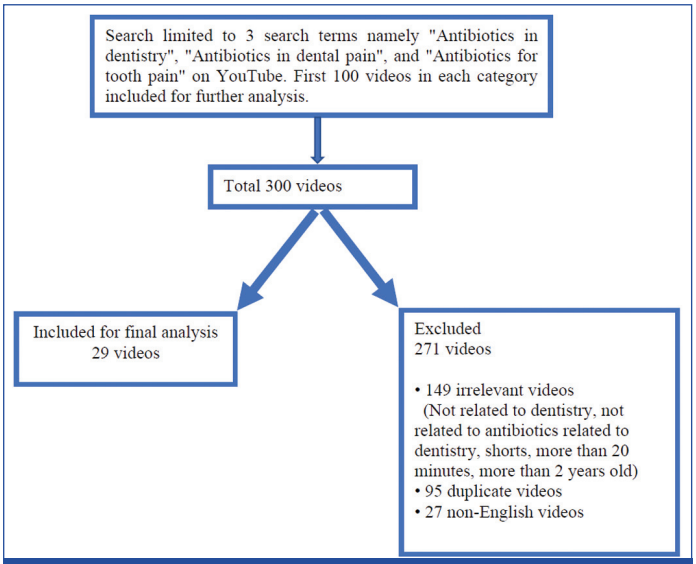
This cross-sectional study was conducted using YouTube at the Department of Oral Medicine and Radiology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India, from January 2024 to March 2024. As this study was based exclusively on publicly accessible data from YouTube, ethics approval was not required. Since no human participants were directly involved, Institutional ethics committee approval was not applicable.

Study design: Using "Keywords" and "sort by relevance" as default criteria, three search terms- "antibiotics in dentistry," "antibiotics in dental pain," and "antibiotics in tooth pain"- were utilised.

Inclusion criteria: It included videos of 2-20 minutes duration, uploaded within the last two years between March 2022 and March 2024, in English, and related to antibiotic use in dentistry.

Exclusion criteria: Videos longer than 20 minutes, shorter than two minutes, older than two years, in other languages, unrelated to antibiotics in dentistry, or duplicates are excluded.

Sample size: Based on the predetermined inclusion and exclusion criteria, the first 300 videos retrieved for all predefined search keyword were screened for relevance. As shown in [Table/Fig-1], 29 videos met the inclusion criteria after the initial screening of 300 videos.



[Table/Fig-1]: Flowchart of video selection process.

Study Procedure

A total of 300 YouTube videos were screened using the defined keywords. Of these, 271 were excluded due to irrelevance (n=149), duplication (n=95), or being non English (n=27). Finally, 29 videos met the inclusion criteria and were considered for analysis. This flowchart visually summarises the selection process, ensuring transparency and reproducibility of the study methodology.

Three researchers independently assessed videos that were viewed on the YouTube website (https://www.youtube.com) on the same day. Evaluation and scoring were carried out independently by two observers. Any discrepancies were resolved by a third observer. Videos were watched on the same day on YouTube, and general parameters recorded included the title, Uniform Resource Locator (URL), uploader type (individual, organisation, or educational source), duration, number of views, likes, dislikes, comments, video duration, days since upload, date of upload, and country of origin. The country of origin was identified based on details provided in the video description, uploader's channel information, or metadata, and videos with no such information were categorised as "not reported". Viewing rate and interaction index were calculated using the equation as shown in [Table/Fig-2].

Metric	Formula
Interaction Index (%)	(Likes – Dislikes) ÷ Views × 100
Viewing Rate (%)	Views ÷ Days since upload × 100

[Table/Fig-2]: Metrics used to assess video performance: interaction index and viewing rate.

The interaction index quantified audience engagement by comparing likes and dislikes relative to total views. The viewing rate reflected the average daily views since upload, indicating each video's reach over time. These metrics provided a quantitative basis for comparing engagement and popularity across the selected videos.

The content of the videos was assessed using a 10-point scale. The scoring criteria were adapted and modified from previously published literature assessing health-related video content, with appropriate adjustments made to suit the topic of antibiotic use in dentistry [17,18]. The scoring parameters includes the following: (1) Indications of antibiotics; (2) Dosage of antibiotics; (3) Side effects of antibiotics; (4) Contraindications of antibiotics; (5) Drug interactions of antibiotics; (6) Antibiotic resistance; (7) Classification/Commonly used antibiotics; (8) Antibiotic prophylaxis; (9) Guidelines for usage; (10) Definitions. Videos that scored exactly five points or less were categorised as having poor content, whereas videos that scored more than five points were categorised as having rich material. After each score was given, the total content score was calculated by adding them all up. The VIQI and the GQS [18] were used to assess the videos' quality. VIQI used a 5-point Likert scale to evaluate content consistency, video quality, clarity, and information flow. Videos were ranked from 1 (poor quality) to 5 (excellent quality) by the GQS. These scores are summarized in [Table/Fig-3]. The final quality interpretation was made by correlating content score, VIQI, and GQS values, where videos with higher scores in all three parameters were considered rich in quality, and those with lower scores were deemed poor quality.

S. No.	Content headings
1	Definition
2	Classification
3	Indications
4	Guidelines
5	Dosage
6	Side-effects
7	Contraindications
8	Drug interactions
9	Antibiotic resistance
10	Antibiotic prophylaxis
	Videos for each content point were scored as 0 (not included) or 1 (included), and a total content score was assigned. Videos with score of less than 5 points were classified as poor-content videos, and those scored above 5 points were classified as rich-content videos.
Score	Description for GQS scale
1	Poor quality, poor flow of the video, most information missing, not at all useful for patients.
2	Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients.
3	Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients.
4	Good quality and generally good flow, most of the relevant information is listed but some topics not covered, useful for patients.
5	Excellent quality and flow, very useful for patients.
	* The GQS evaluation was performed which scored the videos in a range between 1 (poor quality) to 5 (excellent quality).
Score	Description for VIQI scale
VIQI-1	Flow of Information
VIQI-2	Information Accuracy

VIQI-3	Quality (Videos including one point for each one image, animation, interview, video captions and summary)
VIQI-4	Precision (Level of coherence between video title and content)
Total VIQI Score	Sum of all VIQI scores
	*The VIQI scale contains four evaluation criteria and the videos were scored using 5- point Likert scale for each criterion
	The overall quality of each video was evaluated using the VIQI scale, which ranges from 1 (poor quality) to 5 (excellent quality).

[Table/Fig-3]: Content evaluation criteria and quality scales.

Content was assessed using a ten-point scale; videos for each content point were scored as 0 (not included) or 1 (included), and a total content score was assigned. Videos with a score of less than five points were classified as poor-content videos, and those scored above five points were classified as rich-content videos. The GQS rated overall quality from 1 (poor) to 5 (excellent). The VIQI included four domains: flow of information, accuracy, technical quality, and coherence, each scored using a 5-point Likert scale.

STATISTICAL ANALYSIS

The IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, version 21.0 (IBM Corp., Armonk, NY, 2012), was used to perform statistical analyses. The Kolmogorov-Smirnov test was used to evaluate the normality of the data, and nonparametric tests were used because the parameters were not normally distributed. For each video, key metrics including the number of views, likes, dislikes, comments, video duration, time since upload, viewing rate, and interaction index were calculated to assess performance and audience engagement. The Mann-Whitney U-test was used for comparisons after videos were divided into groups with poor and rich material according to their overall content scores. Spearman correlation was used to examine the relationships between the total content score, total VIQI score, GQS, and variables such as duration, likes, dislikes, comments, and viewing rates. Inter-rater reliability between the observers was assessed using Cohen's Kappa for binary data, while the Intraclass Correlation Coefficient (ICC 2,1) was applied to continuous numerical scores to measure absolute agreement.

RESULTS

The average content score was 3.51 out of 10, which was less than the 5-point threshold. Descriptive information as mean and standard deviation are displayed in [Table/Fig-4] displays. The VIQI scale mean was 10.08, and the GQS mean was 2.64.

The Spearman's correlation test was used to compare the characteristics of videos and displays a strong positive correlation (ρ=0.802) between the content score and its corresponding quality measure, indicating a high level of consistency in content evaluation [Table/Fig-5]. Similarly, the content score's correlation with the GQS (ρ=0.736) suggests that videos rated highly in content also score well globally. The correlation between GQS and its specific quality measure (ρ=0.678) further reinforces the reliability of the GQS metric. The VIQI shows a strong alignment with GQS (ρ=0.808), while the internal consistency within the VIQI metric is evident with an even higher correlation (ρ=0.868) between VIQI and its specific quality measure. Engagement metrics also demonstrate strong correlations, with the total number of views closely linked to both the number of likes (ρ=0.936) and dislikes (ρ=0.865), reflecting how increased visibility can lead to diverse viewer reactions. Additionally, the interaction index's correlation with views (ρ=0.948) suggests that higher view counts lead to greater engagement opportunities.

Parameters	Mean±SD (Overall)	U value	p-value	Remarks
Content Score	3.51±2.13	52.00	0.0004 **	Significant difference between poor and rich content videos
Poor content	2.34±1.15			
Rich content	6.27±1.08			
Global Quality Scale (GQS)	2.64±0.92	68.50	0.0203 *	Statistically significant
Video Information and Quality Index (VIQI)	10.08±3.73	82.00	0.853	Statistically not significant

[Table/Fig-4]: Comparison of content score between poor- and rich-content videos, GQS, and VIQI.
Notes: - Mann-Whitney U test was applied to compare parameters between poor and rich content videos; - $p < 0.05$ considered statistically significant (*), $p < 0.001$ highly significant (**); - The "poor" and "rich" subgroup values are applicable only for the Content Score.

Among the 29 videos analysed, the major contributors were general channels 11 (37.93%), followed by health care professionals 8 (27.59%), educational series 5 (17.24%), and health care centres 4 (13.79%). Only one video (3.45%) was uploaded by a dental association (such as the American Dental Association), as shown in [Table/Fig-6a]. Most of these videos were uploaded from India, followed by the USA. Some of the videos were not reported, as shown in [Table/Fig-6b]. The data obtained indicates a significant concentration of videos from India 8 (28%) and the USA 7 (24%), making these two countries the primary contributors, making these two countries the primary contributors. UK, Yemen, Norway, Austria, Spain, Georgia, Pakistan, and Malaysia each contributed only a single video, suggesting a minimal presence in this context. Additionally, there are some videos for which the country of origin was not reported.

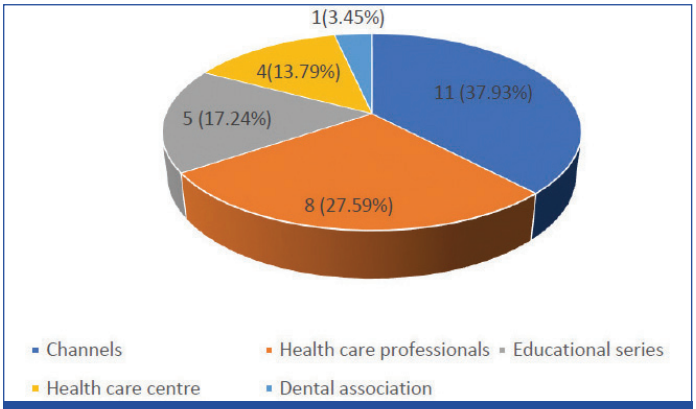
Inter-rater variability was assessed using Cohen's Kappa for binary quality classifications, and ICC 2,1 was used to measure absolute agreement for the raw numerical scores. The strength of agreement was interpreted according to the Landis and Koch classification: <0=poor, 0-0.20=slight, 0.21-0.40=fair, 0.41-0.60=moderate, 0.61-0.80=substantial and 0.81-1.00=almost perfect agreement. Both observers showed substantial agreement on content quality (k= 0.606) and moderate agreement on content score (ICC=0.517) and Global Quality Scale (GQS) scores (k=0.420), as shown in [Table/Fig-7].

Spearman's correlation analysis was used to explore relationships between quality measures (content score, GQS, VIQI) and engagement indices (likes, dislikes, views, comments, interaction index, viewing rate). Strong positive correlations were observed among content quality measures, while engagement indices showed variable associations.

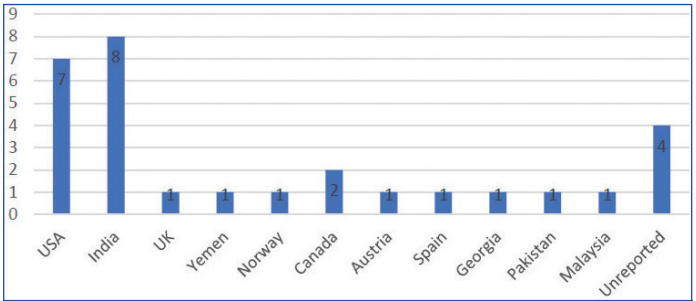
Content score	Content score	Quality based on content score	Global Quality Scale (GQS)	Quality based on GQS	Video Information and Quality Index (VIQI)	Quality based on VIQI	No. of likes	No. of dislikes	Total no. of views	No. of days since upload	Total duration	Total comments	Interaction index (%)	Viewing rate (%)
Quality based on content score	0.802*	1												
Global Quality Scale (GQS)	0.736*	0.575*	1											

Quality based on GQS	0.508*	0.534*	0.678*	1										
VIQI	0.662*	0.503*	0.808*	0.537*	1									
Quality based on VIQI	0.590*	0.502*	0.611*	0.404*	0.868*	1								
No. of likes	-0.195	0.024	0.150	0.048	-0.160	-0.239	1							
No. of dislikes	-0.354	-0.026	-0.298	-0.164	-0.306	-0.289	0.865*	1						
Total no. of views	-0.253	0.096	-0.265	-0.195	-0.231	-0.196	0.936*	0.805*	1					
No. of days since upload	0.148	0.254	0.138	0.091	0.200	0.234	0.329	0.454*	0.252	1				
Total duration	0.100	0.215	0.351	0.131	0.255	0.025	0.203	0.113	-0.009	0.157	1			
Total comments	-0.424*	-0.121	-0.291	-0.115	-0.285	-0.371*	0.737*	0.731*	0.751*	0.092	0.190	1		
Interaction index (%)	0.041	0.137	0.319	0.179	0.179	0.179	0.025	0.378*	0.267	0.107	0.243	0.767*	1	
Viewing rate (%)	-0.276	-0.155	-0.349	-0.054	-0.277	-0.330	0.864*	0.653*	0.948*	-0.004	-0.063	0.715*	0.052	1
*p<0.05, Spearman's correlation test														

[Table/Fig-5]: Correlation between content score, GQS, VIQI, and viewer engagement metrics.
*p<0.05, Spearman's correlation test



[Table/Fig-6a]: Distribution of videos by channel source.



[Table/Fig-6b]: Distribution of videos by country of origin.

The major contributors were general channels 11 videos (37.93%), followed by healthcare professionals 8 videos (27.59%), educational series 5 videos (17.24%), and healthcare centres 4 videos (13.79%). Only one video (3.45%) was uploaded by a dental association (such as the American Dental Association).

Most videos originated from India, 8 (28%) and from the USA 7 (24%), highlighting these two countries as the primary contributors. Single videos were contributed by the UK, Yemen, Norway, Austria, Spain, Georgia, Pakistan, and Malaysia (n=1 each, 3%). A few videos did not report the country of origin.

The inter-rater agreement analysis demonstrated substantial agreement for content quality (κ=0.606). Moderate agreement was observed for GQS quality (κ=0.420) and content score (ICC=0.517). Fair agreement was noted for VIQI score (ICC=0.317), GQS score (ICC=0.265), and VIQI quality (κ=0.239). Overall, the findings indicate acceptable reliability between the evaluators, with stronger agreement for content quality evaluation.

Metric	Statistical test used	Coefficient value	Interpretation (Landis and Koch)
Content quality	Cohen's Kappa	0.606	Substantial Agreement
GQS quality	Cohen's Kappa	0.420	Moderate Agreement
VIQI quality	Cohen's Kappa	0.239	Fair Agreement
Content score	ICC (2,1)	0.517	Moderate Agreement
VIQI score	ICC (2,1)	0.317	Fair Agreement
GQS score	ICC (2,1)	0.265	Fair Agreement

[Table/Fig-7]: Inter-rater agreement using Cohen's Kappa and Intraclass Correlation Coefficient (ICC).

DISCUSSION

Because social media and the internet are becoming more and more important information sources, doctors need to be on the lookout for information that is accurate and trustworthy for their patients. Platforms like YouTube have made educational videos widely accessible, making it easier for patients to learn about health topics. However, the ease of video creation and sharing also brings forth concerns about the validity and timeliness of such information [19]. Given the rapid advancements in medical science, educational content can become outdated quickly. A video that was accurate a few years ago may no longer reflect the most current research findings or clinical guidelines, thereby contributing to misinformation. Furthermore, some of these videos are created by individuals without appropriate medical training, which increases the risk of disseminating incorrect or misleading health advice.

Dentists, therefore, play a critical role in helping patients navigate this information landscape. By engaging in open discussions with patients about the health-related content they come across online, physicians can clarify misconceptions, contextualise information,

and guide patients towards reliable sources. This proactive approach ensures that patients make informed decisions grounded in accurate and up-to-date medical knowledge [20].

In the present study, the analysis of video content revealed that general channels often operated by non healthcare professionals accounted for the largest share of uploads (37.93%), indicating that a substantial proportion of available content originates from non professional sources. These creators may lack the clinical expertise required to present medically accurate information, yet their content often garners substantial viewership. The lack of standardised control over video content on YouTube has resulted in a wide variation in quality, facilitating the unchecked spread of misinformation. This underscores the pressing need for healthcare professionals and authoritative medical bodies to engage more actively in producing and promoting high-quality educational content.

It is interesting to note that these videos' average content score was 3.51/10, below the middle of the scoring range. This result suggests that a sizable portion of videos do not offer thorough or accurate information regarding antibiotics. The mean GQS score was 2.64 (p=0.020), and the mean VIQI was 10.08 (p=0.853, not statistically significant), indicating that overall video quality was moderate. The VIQI score indicates moderate viewer interaction quality, but a GQS score close to 3 indicates average quality. These scoring discrepancies show how different video sources are in terms of both content quality and interaction tactics.

The fact that older videos, which are frequently out-of-date and lack recent updates, continue to draw sizable viewership is alarming, even if the amount of time after a video was uploaded was proven to be statistically unimportant in terms of content quality. This points to a need for intervention, where platforms like YouTube could flag or remove outdated health-related content to prevent the perpetuation of obsolete or incorrect information. Thus, the dual role of social media platforms such as YouTube as both valuable educational resources and sources of misinformation is clearly highlighted. This duality emphasises the need for responsible digital health communication [21].

Furthermore, significant correlations were observed between video view rates and both the interaction index (correlation coefficient: 0.864) and total number of views (0.948), indicating that more engaging videos tend to be watched more thoroughly and attract larger audiences. These strong correlations reinforce the reliability of the evaluation metrics employed, validating their utility in assessing video quality and user engagement. In addition, significant differences were found between groups in terms of number of comments, video duration, interaction index, and viewing rates ($p<0.05$), consistent with findings reported by Albayrak E and Büyükçavuş MH in 2023 while the interaction index and video time showed a weak positive correlation (correlation coefficient: 0.243) in this study, Ho A et al., (2017) also found a positive link between these two factors [18,22].

A robust positive correlation (0.808) was observed between VIQI and GQS, indicating alignment between these two metrics. Videos that featured rich, informative content scored significantly higher, achieving mean VIQI and GQS scores of 12.89 and 4, respectively, with p-values of 0.035 and 0.0001. These findings align with the study by Albayrak E and Büyükçavuş MH, which similarly demonstrated that content richness directly correlates with higher video quality [18]. Additionally, higher-quality videos received fewer dislikes, as evidenced by negative correlations between dislikes and both VIQI (-0.306) and GQS (-0.298).

Although social media allows for effective health communication, it also presents substantial risks when content is unregulated or misleading [13,16]. Alarming statistics, such as the significant number of neonatal deaths in India due to antibiotic-resistant sepsis [5], underscore the gravity of the issue. Furthermore, the high rate of antibiotic prescriptions for dental issues, surpassing those for other conditions, suggests a possible underestimation of antibiotic use when over-the-counter consumption is not accounted for [8].

Limitation(s)

The present study has certain limitations. Only three search terms were used, which may limit the comprehensiveness of the findings. The relatively small sample size of 29 videos, selected after rigorous screening, limits the generalisability of the findings. Only English-language videos were analysed, potentially excluding relevant content in other languages, especially in multilingual countries like India. The evaluation was static, focusing on videos available at a specific time, while YouTube's dynamic nature means that new videos are continually uploaded and older ones removed. Additionally, the study was restricted to YouTube, ignoring other platforms like Facebook or Instagram, which may also influence public perceptions of antibiotic use. Lastly, the study relied on subjective scoring systems, which, despite being validated, may introduce observer bias.

CONCLUSION(S)

In conclusion, the present study revealed that most YouTube videos on antibiotic use in dentistry lack comprehensive and reliable content, with significant variations in quality and engagement across sources. The prevalence of moderate- to low-quality information underscores the urgent need for stricter content evaluation and increased contributions from credible healthcare professionals. Strengthening regulatory measures and promoting patient awareness are essential to mitigate the risks of misinformation and antibiotic misuse. Furthermore, collaboration between dental associations and content creators is recommended to develop accurate, evidence-based, and engaging digital educational materials, ensuring that patients and the public have access to trustworthy information.

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