Title: YouTube Information about Diabetes and Oral Healthcare

ABSTRACT
Aim: Diabetes mellitus is a chronic disease that is increasing at an alarming rate all over the world. The aim of this study was to assess the information available on YouTube on diabetes and oral healthcare.

Methods: This cross-sectional study made a search in YouTube (https://www.youtube.com/) applying the search terms “oral healthcare for diabetics.” Two reviewers assessed the videos and categorized them into useful, misleading or personal experience, and scored them using a global quality scale (GQS) from 1-5 according to their overall quality (1 = poor quality; 5 = excellent quality). The source of each video was also registered, as was user interaction with each video.

Results: A total of 97 videos were included for analysis. Of these, 30 (30.9%) contained useful information, 61 (62.9%) contained misleading information, and six (6.2%) recounted personal experiences. Overall quality scores showed statistically significant differences between those containing useful information and those with misleading information and personal experience (p=0.001). Significant differences in content were also found regarding oral hygiene (p=0.022), periodontitis (p=0.002), and infection (p=0.04).

Conclusions: YouTube provides informative videos about oral healthcare for diabetics. The quality of the videos was variable and the videos recorded by dental professionals and Universities showed a higher quality. Further research is needed into oral healthcare for diabetics.

Key words: Oral care, diabetes, periodontal disease, videos.
INTRODUCTION

Diabetes mellitus is a chronic disease that is increasing at an alarming rate all over the world. It constitutes a worldwide epidemic, with complications that have a significant impact on the quality of life and longevity of patients, as well as on healthcare costs [1-3]. Healthcare users are increasingly resorting to the Internet as a source of information, but out-of-date or misleading medical information is a major obstacle to the provision of worthwhile help [2,4-6].

Web-based resources are no substitute for professional-patient relationships. Nevertheless, it is a fact that a high proportion of adults seek medical information on the Internet [4-6]. YouTube, one of the most popular video-sharing websites, is increasingly being used to disseminate health information and could represent a useful educational tool for the prevention and treatment of diabetes. However, the uneven quality of the information currently available is a concern [7].

A systematic review analyzing medical information on YouTube found misleading information that failed to meet the standards of evidence-based medicine [8]. Diabetics are more likely to present poor oral health and may suffer a range of oral complications such as periodontal disease (affecting the gums), reduced or absent saliva, dental caries, oral candidiasis, or burning mouth syndrome (chronic oral pain) [8-18].

Periodontal disease is often cited as diabetes’ sixth complication [12,16]. Recent research has show that diabetes and periodontal disease have a bi-directional
relationship, which means that diabetes increases the risk of periodontal disease, which in turn compromises glycemic control [12-16]. Moreover, research has shown that periodontal treatment has beneficial effects on glycemic control, leading to reductions in glycosylated (HbA1C) that vary between 0.3% and 0.7% [10-13,16]. Despite the relationship between diabetes and oral health, surveys indicate that diabetics have little knowledge of the involvement of oral health and the importance of oral hygiene maintenance. In this context, YouTube could be a useful tool for providing information about this topic [14,15]. The aim of this study was to assess the content, and quality of information about oral healthcare for diabetic patients available on YouTube.

**MATERIALS AND METHODS**

A video selection strategy was used to identify videos (https://www.youtube.com/) for analysis. Studies of Internet search engines have shown that more than 90% of users click on a search result that appears on the first three pages of search results (with 20 hits per page) [19-22]. Given the impracticability of reviewing the 472,400 videos identified, it was decided to focus on the first page of results (the first 20) in each search, in sequential order selecting a total of 100 videos. The selection was made in December 2017. The study did not require the approval of an Ethics Board. All the videos focused on diabetes and included related information about oral care. The search was performed in both English and Spanish using – in addition to “diabetes” – the following search terms: dental care / oral care / oral hygiene / oral manifestations / dental treatment / dental management / gingivitis / periodontitis / xerostomia / dry mouth / taste / dental prevention / oral infection / oral pain / oral bleeding / maintain oral function / burning mouth / tooth loss / halitosis / oral

Any videos that provided general information about diabetes exclusively, or complications such as nephropathy, retinopathy, the treatment of diabetes, descriptions of surgical techniques, or animal research, or links to videos that didn’t work, or videos with poor sound, were excluded from analysis. Data extraction was performed by two reviewers independently. In case of discrepancies, these were resolved by consensus between the researchers. The kappa statistic for inter-observer agreement was 0.836

The methodology used to review the videos in this study was based on previous research (2, 19-25). The data and variables registered were as follows: days since upload, duration of the video, likes, dislikes, comments, and interaction index (like-dislikes/total number of viewings x 100). On the basis of the main topic, video content was categorized as:

a) Useful: the video contained scientifically solid information about some aspect of oral care of diabetics; b) Misleading, containing scientifically unproven information about some oral aspect of diabetes; c) Personal experience of diabetes and oral care recounted by a patient.

The videos were classified according to source as follows: a) professional associations; b) Universities; c) state TV channels; d) other sources.

Lastly, the overall quality of the videos was scored subjectively using a five-point Likert-type global quality scale (GQS) that awarded a score as follows: [19].

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 adequately discussed, but other information poorly discussed; somewhat useful for patients.

4 - Good quality and generally good flow; most of the relevant information listed, but some topics not covered; useful for patients.

5 - Excellent quality and flow; very useful for patients.

The reliability of each video was evaluated by means of the DISCERN instrument [20], a five-item questionnaire for assessing health information (Scoring: 1 point is given for every yes and 0 points for every no). The items were as follows: 1) Are the aims clear and achieved? 2) Are reliable sources of information used (i.e. publication cited, speaker is specialist in diabetes)? 3) Is the information presented both balanced and unbiased? 4) Are additional sources of information listed for patient reference? 5) Are areas of uncertainty mentioned?

Types and topic domains
The most frequently mentioned oral topics that were analyzed were: caries, periodontal diseases, oral hygiene maintenance, loss of teeth; alterations in taste, pain, oral infections, xerostomia/burning mouth syndrome and dental treatment complications.

Statistical analysis was performed using the statistical software package SPSS 20.0 for Windows. Descriptive statistics were calculated for each variable. Variables were tested for normality using the Shapiro-Wilk test. Differences between continuous variables across the three categories of usefulness were assessed using analysis of variance for normally distributed variables, the Kruskal-Wallis test, and Mann-Whitney U-test. Statistical significance was set at $p \leq 0.05$. 

RESULTS

A total of 97 videos were selected for analysis (Figure1). Of these, 30 (30.9%) were considered useful, 61 (62.9%) provided misleading information, and six (6.2%) described patients' personal experiences; the videos' characteristics are shown in Table 1. It was found that the global quality scale values of videos considered useful showed statistically significant differences in comparison with the misleading group and personal experience videos (p=0.001). The duration of the videos was longer among useful videos with significant difference in comparison with the other two categories (p=0.006).

When the sources of the videos were analyzed, it was found that professional associations had produced 39 videos (40.2%), Universities eight (8.2%), state TV channels 41 (42.3%), and nine videos came from other sources (9.3%). No statistically significant differences were found for the variables like/dislike (p>0.05), user interaction (p>0.05), or duration (p>0.05). When global quality scale results were analyzed in relation to source, significant differences were found, whereby professional associations and Universities obtained higher scores (p=0.013). (Table 2)

Assessing the reliability of the information provided using DISCERN, it was found that the mention of areas of uncertainty (item 5) was more frequent in videos classed as useful with significant difference (p=0.001). (Table 3)

The most frequently mentioned oral topics were periodontal disease, oral hygiene maintenance, loss of teeth, infection and caries. When classifying (useful, misleading, personal experience) by topic, we found significant differences in content regarding oral hygiene maintenance (p=0.022), periodontitis (p=0.002), and oral infection (p=0.04). (Table 4)
DISCUSSION

The YouTube video-sharing network provides a vast range of user-generated content and allows users to communicate easily at no cost. This study is the first to investigate the content of YouTube videos on oral care of diabetics, and to assess the quality of the information provided.

The fact that diabetes is a chronic disease that needs continuous attention means that good relations between diabetics and healthcare professionals can improve patients’ quality of life and the outcomes of both oral health and diabetes management. For many years, it was thought that patients would follow medical advice unquestioningly. But today, the situation has changed and there is a move to involve diabetic patients in actively managing their condition. While a shift in patients’ attitudes is beginning to take effect, additional support is needed to motivate patient collaboration and it is in this context that videos could be a valuable and relatively effortless instrument for helping patients to self-manage their diabetes [21,25-28]. Moreover, it has been shown that increasing patients' knowledge of the risk factors to which they are subject can lead to better clinical outcomes [11-18]. The information displayed on the oral healthcare videos is incomplete, therefore there is a need of an intervention from healthcare professionals. [2, 29-30]. Optimizing patient behavior related to oral healthcare is a fundamental aspect in the care of diabetics, and imparting knowledge, understanding, and skills will facilitate self-management, decision-making, and lifestyle changes among diabetics. Diabetics need to be informed of all the health risks related to the disease.
Patients with badly-managed diabetes are at risk from a range of oral diseases including oral infection, saliva dysfunction, periodontitis, and caries, which may lead to dental loss [14-18].

Diabetics must be warned of their greater risk of gingivitis and periodontitis. Diabetes increases the destruction of periodontal ligament and gums significantly, which in turn have negative effects on glycemic control [4-8]. It is important to stress the fact that poor glycemic control is associated with poor periodontal health. Periodontitis is associated with dysglycemia and increases resistance to insulin as well as a higher risk of diabetic incidents and complications. The management of periodontal disease improves serum levels of HbA1C [9,13,16]. Videos may constitute a useful means of highlighting the importance of oral care and provide useful and beneficial information about risk factors, oral hygiene regimes and techniques, tooth-brushing instruction, interdental cleaning, and in some cases, the use of complementary chemical plaque control, as well the management of additional complications such as dry mouth.

The method used to classify the videos and evaluate their medical content has been used in other works of healthcare research [2,21-25]. The present review found that oral care content varied from highly specialized oral healthcare information to personal experiences of the disease. In general, it was found that the videos classed as useful also presented better global quality scores (p=0.001). The same happened when the sources of the videos were analyzed, so that information provided by professionals and Universities obtained higher global quality scores with statistically significant difference (p=0.013)

The reliability of the information provided in videos was assessed by means of the DISCERN instrument, a 5-item questionnaire, which identified more reliable
information in those videos classified as useful; the same videos also pointed out any uncertainties in the oral care-related topics dealt with (item 5).

Limitations
When searching for relevant information, the YouTube algorithm favors the ordering of reliable videos at the top of the search results [19], and so it is possible that the present findings over-estimated the quality of the videos available in general. Moreover, given the dynamic nature and volume of video material, the results belong to the moment and cannot reflect past and future quality. This transversal study only captured an instant in the constantly changing range of video material available. Moreover, the classification of videos as useful or otherwise was necessarily subjective.

Conclusion
YouTube is a source of information about oral care for diabetic patients. Videos can be an effective educational tool that can promote detection and oral care and help patients to recognize characteristics that indicate problems. Healthcare professionals should recognize the potential influence of videos available on the Internet on patients’ attitudes. The quality of the videos was variable and the videos recorded by dental professionals and Universities were of higher quality. Further research needs to focus on the importance of oral hygiene and habits as it is necessary to incorporate oral care into the management of diabetes.

CONFLICT OF INTEREST  NONE

FUNDING THERE IS NO FUNDING
REFERENCES


24. Lopez-Jornet P, Pons-Fuster E, Ruiz-Roca JA. YouTube videos on oral care of the organ or hematopoietic stem cell transplant patients. Support Care Cancer


Table 1: Attributes of videos classified as “Useful,” “Misleading,” or “Personal experience.”

<table>
<thead>
<tr>
<th></th>
<th>Useful N=30 Median IQR</th>
<th>Misleading N=61 Median IQR</th>
<th>Personal experience N=6 Median IQR</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>GQS, Global Quality Scale</td>
<td>4 (3-4) a</td>
<td>3 (2-3) b</td>
<td>2.5 (2-3) b</td>
<td>0.001</td>
</tr>
<tr>
<td>Times seen</td>
<td>709 (188-2443)</td>
<td>275 (60-1358)</td>
<td>479.5 (64-1372)</td>
<td>0.15</td>
</tr>
<tr>
<td>Likes</td>
<td>4 (0-19)</td>
<td>1 (0-3.5)</td>
<td>2 (1-4)</td>
<td>0.102</td>
</tr>
<tr>
<td>Dislikes</td>
<td>0 (0-1)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
<td>0.069</td>
</tr>
<tr>
<td>Comments</td>
<td>0 (0-1)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
<td>0.047</td>
</tr>
<tr>
<td>Interaction index</td>
<td>0.46 (0-0.75)</td>
<td>0.19 (0-0.6)</td>
<td>0.57 (0.22-0.85)</td>
<td>0.261</td>
</tr>
<tr>
<td>Duration (minutes)</td>
<td>3.2 (2.19-11.1) a</td>
<td>3.13 (1.2-5.2) b</td>
<td>1.7 (1-4.19) b</td>
<td>0.006</td>
</tr>
</tbody>
</table>

a-b comparison **Mann-Whitney U-test; IQR: interquartile range**
Table 2: Global Quality in relation to video source – professional association, Universities, state TV, or other sources.

<table>
<thead>
<tr>
<th></th>
<th>Professional N=39 Median IQR</th>
<th>University N=8 Median IQR</th>
<th>TV l N=41 Median IQR</th>
<th>Other sources N=9 Median IQR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GQS, Global Quality Scale</td>
<td>3 (3-3) b</td>
<td>3.5 (3-4) b</td>
<td>3 (2-3) a</td>
<td>2 (2-3) ab</td>
<td>0.01</td>
</tr>
</tbody>
</table>

a-b *Mann-Whitney* U-test
Table 3: DISCERN scores for “Useful,” “Misleading,” and “Personal experience” Videos

Chi-squared test

Notes: Scoring: 1 point is given for every yes and 0 points for every no.

<table>
<thead>
<tr>
<th></th>
<th>Useful (n=30)</th>
<th>Misleading (N=61)</th>
<th>Personal experience (N=6)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are the aims clear and achieved?</td>
<td>29 (96.7%) a,b</td>
<td>58 (95.1%) a,b</td>
<td>5 (83.3%) a,b</td>
<td>0.399</td>
</tr>
<tr>
<td>2. Are reliable sources of information used (i.e., speaker is a health professional, publications were cited)?</td>
<td>29 (96.7%) a,b</td>
<td>53 (86.9%) a,b</td>
<td>5 (38.3%) a,b</td>
<td>0.307</td>
</tr>
<tr>
<td>3. Is the information presented balanced and unbiased?</td>
<td>26 (86.7%) a,b</td>
<td>43 (70.5%) a,b</td>
<td>3 (50%) a,b</td>
<td>0.906</td>
</tr>
<tr>
<td>4. Are additional sources of information listed for patient reference?</td>
<td>8 (2.7%) a,b</td>
<td>6 (9.8%) a,b</td>
<td>1 (16.7%) a,b</td>
<td>0.113</td>
</tr>
<tr>
<td>5. Are areas of uncertainty mentioned</td>
<td>16 (53.3%) a</td>
<td>10 (16.4%) b</td>
<td>1 (16.17%) b</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Table 4: Information about video content according to classification (useful, misleading, personal experience).

*Notes:* Scoring: 1 point is given for every *yes* and 0 points for every *no*. Chi-squared test

<table>
<thead>
<tr>
<th>Condition</th>
<th>Useful N=30</th>
<th>Misleading N=61</th>
<th>Personal experience N=6</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caries</td>
<td>11 (36%)</td>
<td>19 (31.1%)</td>
<td>1 (16.7%)</td>
<td>0.616</td>
</tr>
<tr>
<td>Periodontitis</td>
<td>27 (90%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>35 (57.4%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2 (33%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.002</td>
</tr>
<tr>
<td>Oral hygiene maintenance</td>
<td>25 (%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23 (38.3%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2 (33%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.022</td>
</tr>
<tr>
<td>Alterations to taste</td>
<td>7 (24.1%)</td>
<td>9 (14.8%)</td>
<td>1 (16.7%)</td>
<td>0.551</td>
</tr>
<tr>
<td>Loss of teeth</td>
<td>18 (60%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23 (37%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2 (33%)&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>0.113</td>
</tr>
<tr>
<td>Oral pain</td>
<td>9 (30%)</td>
<td>11 (18.3%)</td>
<td>1 (16.7%)</td>
<td>0.429</td>
</tr>
<tr>
<td>Infection</td>
<td>16 (53.3%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>17 (28.3%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1 (16.7%)&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>0.040</td>
</tr>
<tr>
<td>Xerostomia</td>
<td>10 (33.3%)</td>
<td>17 (27.9%)</td>
<td>1 (%)</td>
<td>0.685</td>
</tr>
<tr>
<td>Treatment complications</td>
<td>7 (23.3%)</td>
<td>8 (13.3%)</td>
<td>0%</td>
<td>0.259</td>
</tr>
</tbody>
</table>