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CLINICAL TRIAL

YouTube English videos as a source of information on breast self-examination

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Abstract

Objective To examine the content, quality and reliability of YouTube videos related to breast self-examination.

Design A search of YouTube was made on 21.06.2018 using the keyword of "breast self-examination". The videos were categorised by two doctors as useful information or misleading information. To evaluate the quality of the videos, a 5-point global quality scale was used (GQS: 1 = poor quality, 5 = excellent quality), for reliability a 5-point DISCERN scale was used, and for content an 8-point scale (higher points indicated greater reliability and better content).

Results Of the 200 videos initially included in the study, 33 (37.9%) were classified as useful and 54 (62%) as misleading information. The reliability, content and quality scores of the videos in the useful information group were higher. The length (in seconds) of the videos in the useful information group (median 301, IQR 231–512) was longer than that of those in the misleading information group (median 163, IQR 94.8–231) ($p = 0.003$). The majority (70.6%) of the videos in the misleading information group had been uploaded by an individual user. The number of views per day of the videos in the misleading information group (median 58.6, IQR 18.5–298) was greater than that of the videos in the useful information group (median 49.7, IQR 16.3–268) ($p = 0.276$). The number of total views was higher for the misleading information group (median 83807 vs. 80237) but not at a level of statistical significance ($p = 0.153$). There were more videos explaining breast self-examination directed at women only, and there were determined to be few videos including men only or both genders.

Conclusion Although there are many videos in English related to breast self-examination on YouTube, a great many of these contain misleading information. Therefore, for public information, there is a need for videos with full and accurate information to be made by universities, healthcare organisations and doctors not benefitting from the outcomes, to be uploaded to YouTube, which is a currently important source of information for the general population.

Keywords Breast self-examination · Breast cancer · Patient education · Internet · YouTube

Introduction

Throughout the world, breast cancer is the second most frequently seen cancer and the most frequent cancer in females. Despite an increase in the incidence of breast cancer in recent years [1], mortality rates associated with the disease are gradually reducing due to an understanding of the importance of early diagnosis and advances in treatment [2].

The utility of breast screening is to detect the potential disease as early as possible without any symptoms or signs. The main factors influencing the components of breast screening are age, medical and family history. Basic elements of breast screening are first to allow the individual to be familiar with her breast and to be aware of changes (breast awareness), regular clinical visits with clinical examination and risk assessment, screening mammography and breast MRI when necessary [3]. Although the effects on mortality have not been proven and there is ongoing debate on breast self-examination (BSE) [4–7], it is very important for women to be part of the assessment of their own breast health, because they are the first person to notice the change in their breast structure [8]. BSE provides breast

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awareness and NCCN Panel recommends breast awareness [3]. Through regular BSE, an individual will understand how the breasts normally look, learn the feeling created when touched and can therefore present immediately at a healthcare facility when there is any change.

The effectiveness of BSE depends on the person doing it, the guidelines taken and the form of examination [9]. Before applying BSE, breast examination should be taught by a qualified healthcare worker, and thus the value of the examination applied will increase.

With the increasing popularity of online healthcare information, people are tending to use the internet as an important source of healthcare information. According to the results of the National Health Interview Study, 43.55% of American adults used the Internet to search for health information in 2011 [10].

The use of YouTube as an educational tool and source of medical information has become very popular among patients and healthcare professionals [11]. YouTube users constitute 95% of all internet users [12]. Previous studies have examined the quality and content of educational YouTube videos for methotrexate injection, cervical cancer, rheumatoid arthritis and mammography [13–16]. Studies have reported that YouTube videos are an educational tool and information source for patients.

There is a current lack of data about the evaluation of YouTube BSE videos as an information source. The aim of this study was to evaluate the content, reliability and quality of the most viewed YouTube videos teaching breast self-examination.

Methods

A search was made of YouTube (http://www.youtube.com) using the keyword 'breast self-examination' for videos on 21 June , 2018. It has been reported that 90% of internet users click on the first three pages of the query results [17]. Each page contains a maximum of 20 videos so two physicians independently evaluated the first 200 videos. The videos were obtained using the default settings on YouTube, in which the results were sorted according to the most viewed. The videos were saved in a playlist because search results on YouTube can change from day-to-day. When there were duplicate videos, only one was taken into consideration. Multi-part videos were counted as one, and audience interaction parameters were averaged over the number of the parts. Videos were excluded if they were irrelevant, non-English, or had no accompanying audio. This search strategy has been used in other studies related to YouTube in the medical literature [11, 13, 15, 18]. The search yielded 23,300 videos in total.

Evaluation of the usefulness of the videos

Two physicians independently evaluated all the videos (EE, MA) for usefulness and grouped them into the following categories. The two doctors were blinded to each other's evaluations. When there was a lack of consensus, a final decision was made by a third doctor (BCS). The group classifications were:

1. Useful information (Group 1): these were weighted towards the transfer of information. It covers most or all of the steps related to how BSE should be done. The information was correct and they were helpful for learning BSE.
2. Misleading information (Group 2): these included incorrect information about BSE. Even if the video was partially useful and contained partially misleading information about BSE it was classified as misleading (e.g., appropriate time for BSE is not or wrongly stated, necessity of upper clothes removal is not pointed out, images and statement are not overlapped).

Classification of the video characteristics

The videos were separated into five groups according to the source of the upload: source 1, government/news agencies; source 2, university channels/professional organisations/non-profit-physician/physician groups; source 3, stand-alone health information websites; source 4, medical advertisements/for-profit-companies; source 5, individual.

The videos were separated into 3 groups according to the target audience as female, male and both genders.

The videos were separated into four groups according to who was giving the explanation: 1, physician; 2, non-physician health provider; 3, individual in the video; 4, external voice.

For each video, the total number of views, the length of the video and when it was uploaded were recorded. Viewer interaction with the video was evaluated as the number of views per day (calculated by dividing the total number of views by the number of days since it had been uploaded), and the number of "likes", "dislikes" and comments.

Video reliability was scored using a modified 5-point DISCERN tool [15] (adapted from the original DISCERN tool for assessment of written health information by Charnock et al. [19] (Table 1).

The overall quality of all the videos was rated using the 5-point Global Quality Score (GQS). This scale was developed as an evaluation tool for website resources, and it assesses the flow and ease of use of the information presented online and the quality of the video [20] (Table 1).

Table 1 Evaluation tools for reliability, global quality, and comprehensiveness of the YouTube videos on BSE

Reliability (1 point per question if answered yes)
1. Are the explanations given in the video clear and understandable?
2. Are useful reference sources given? (publication cited, from valid studies)
3. Is the information in the video balanced and neutral?
4. Are additional sources of information given from which the viewer can benefit?
5. Does the video evaluate areas that are controversial or uncertain?
Global quality scale
1. Poor quality, poor flow, most information missing, not helpful for patients
2. Generally poor, some information given but of limited use to patients
3. Moderate quality, some important information is adequately discussed
4. Good quality good flow, most relevant information is covered, useful for patients
5. Excellent quality and excellent flow, very useful for patients
Comprehensiveness (1 point per each covered on video)
1. The most appropriate time for breast examination is stated
2. The upper clothes are removed
3. The subject is standing in front of a mirror
4. Changes that require examination in the mirror
5. How breast examination should be made with the hand
6. Breast examination with the hand while lying/sitting/standing
7. What should be looked for in breast examination with the hand
8. Inclusion of the areola nipple complex and the axillary region in the examination

Video comprehensiveness was also evaluated on an 8-point scale to assess the instructions for breast self-examination. One point was given for each step covered on the video (Table 1).

Statistical analysis

Data obtained in the study were analysed using Jamovi 0.9 software. Numerical variables were stated as mean ± standard deviation (SD) or median and interquartile range (IQR) values. In the comparison of numerical variables, the Student's *t* test, Mann–Whitney *U* test, ANOVA and the Kruskal–Wallis test were applied. The DSCF post hoc test was used after the Kruskal–Wallis test. Categorical variables were stated as number (*n*) and percentage (%). In the comparison of categorical variables, the Chi-square and Fisher's Exact tests were used. A value of $p < 0.05$ was accepted as statistically significant.

Results

Using the search term of "breast self-examination", the first 200 most viewed videos on YouTube were examined, of which 87 were included in the study for further analysis. A total of 85 videos were excluded as they were irrelevant (*n*: 51), had no audio (*n*: 9), were not in English (*n*: 24) or were not visual (*n*: 1). A further 2 videos were in 15 sections, so were included as 2 videos, and 28 videos that were duplicated were included as 13 videos. The 87 videos included in the study were classified as 33 (37.9%) in the useful information group and 54 (62%) in the misleading information group (Fig. 1). The classification of the characteristics is shown in Table 2. A statistically significant difference was determined in favour of the useful information group in respect of the length of the videos, reliability, comprehensiveness and the GQS score parameters ($p < 0.05$).

Comparisons were made according to the source of the video uploading (Table 3). No videos were found that had been uploaded by the government, and 39.1% of all the videos had been uploaded by an individual. In the videos of the useful information group, 33.3% had been uploaded by universities/professional organisations/non-profit organisations/physicians/physician groups, 21.2% by stand-alone health information websites, and 30.3% by individuals. In the misleading information group, 44.4% of the videos had been uploaded by individuals. Comparative evaluation was made between the groups in respect of reliability, comprehensiveness and GQS scores (Table 4). The reliability, comprehensiveness and GQS scores of sources 2 and 3 were seen to be statistically significantly higher than those of sources 4 and 5.

Discussion

YouTube was established in September 2005 as a video-sharing site. Local versions have spread to more than 88 countries and search and browsing can be performed in 76 different languages. YouTube users constitute 95% of all internet users [12]. There is a range of information on the Internet about medical subjects (personal health experiences, medical innovations, professional opinions, literature information, comments by uninformed people etc),

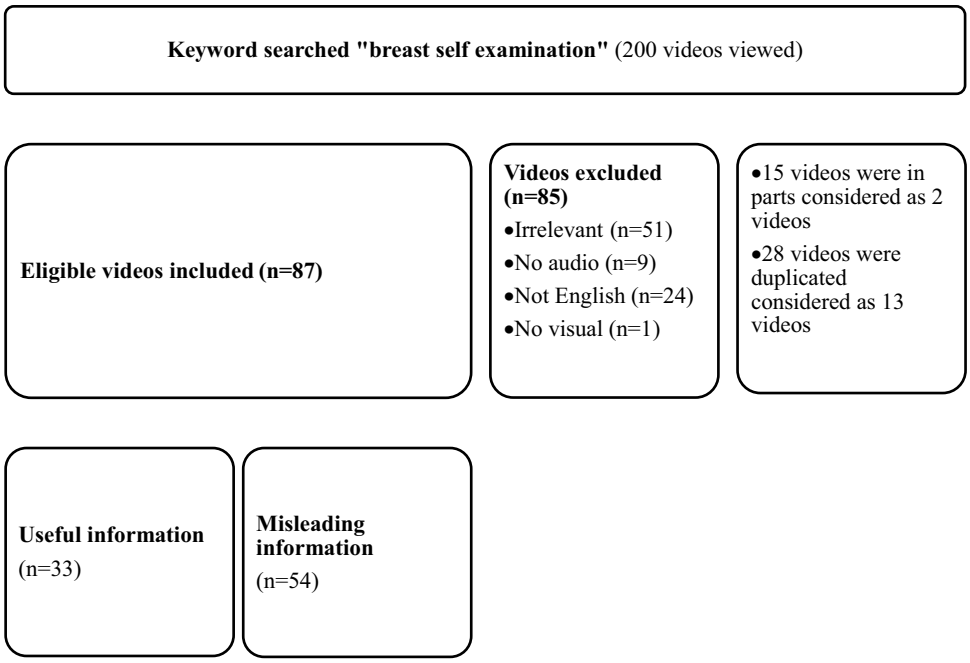

Fig. 1 Selection of eligible Youtube videos for the study

Table 2 Analysis of video characteristics by usefulness category

Characteristics	Useful information N = 33	Misleading information n = 54	*p* value
Total views	80,237 (33,967–234,740)	83,807 (39,025–299,571)	0.153
Video length (s)	301 (231–512)	163 (94.8–231)	**0.003**
Duration on YouTube (months)	63.3 ± 37.7	68.5 ± 38.2	0.538
Views per day	49.7 (16.3–268)	58.6 (18.5–298)	0.276
Likes	69 (31–243)	51.5 (24–342)	0.875
Dislikes	19 (7–53)	14.5 (6–71)	0.206
Comments	4 (0–18)	8.5 (2-34.3)	0.377
Reliability score	3.36 ± 0.859	1 ± 0.752	< **0.001**
Comprehensiveness score	6.76 ± 0.792	2.81 ± 1.97	< **0.001**
GQS score	4.18 ± 0.584	1.74 ± 0.732	< **0.001**
Source of upload, *n* (%)			
Universities/professional organisations/non-profit physician/physician groups	11 (33.3)	9 (16.7)	**0.034**
Stand-alone health information websites	7 (21.2)	4 (7.4)	
Medical advertisement/for profit companies	5 (15.2)	17 (31.5)	
Individual	10 (30.3)	24 (44.4)	
Speaker, *n* (%)			
Physician	13 (39.4)	18 (33.3)	0.791
Non-physician health provider	2 (6.1)	2 (3.7)	
Individual in the video	8 (24.2)	18 (33.3)	
External voice	10 (30.3)	16 (29.6)	
Gender, *n* (%)			
Female	28 (84.8)	49 (90.7)	0.457
Male	0 (0.0)	1 (1.9)	
Both	5 (15.2)	4 (7.4)	

Bold values indicate the signifcant of $p < 0.05$

Variables are presented as mean ± standard deviation, median (Q1–Q3) or frequency (%) values

Table 3 Analysis of video characteristics by source of uploads

	Universities/professional organisations/non-profit physician/physician groups	Stand-alone health information websites	Medical advertisement/ for profit companies	Individual	*p*
Video number (%)	20 (23%)	11 (12.6%)	22 (25.3%)	34 (39.1%)	
Reliability score	2.45 ± 1.61	2.82 ± 1.47	1.41 ± 1.10	1.59 ± 1.21	**0.013**
Comprehensiveness score	5.25 ± 2.69	5.27 ± 2.57	3.45 ± 2.30	4 ± 2.35	**0.024**
GQS score	3.25 ± 1.41	3.55 ± 1.51	2.18 ± 1.14	2.35 ± 1.23	**0.007**
Total view	42,643 (33,755–143,109)	196,408 (77,596–946,507)	122,676 (57,896–704,442)	65,796 (35,632–187,847)	0.610
Video length (s)	295 (197–498)	201 (180–360)	141 (97.5–211)	225 (111–310)	0.058
Duration on YouTube (months)	63 ± 31	48.3 ± 34.5	72 ± 40.3	70.9 ± 40.4	0.306
Views per day	36.6 (16.7–52.8)	268 (66.8–1502)	121 (20.1–564)	56.1 (16.2–139)	0.745
Likes	45 (30.5–64)	448 (144–1050)	117 (21.8–367)	51.5 (25–156)	0.528
Dislikes	12.5 (6-27.3)	83 (15–239)	21.5 (9.25–121)	13.5 (3.25–40.3)	0.377
Comments	3 (0-8.25)	16 (2.5–54.5)	10.5 (1.5–60.8)	5 (2.25–28.3)	0.607
Speaker, n (%)					**0.003**
Physician	8 (40.0)	6 (54.5)	12 (54.5)	5 (14.7)	
Non-physician health provider	2 (10)	0 (0)	1 (4.5)	1 (2.9)	
Individual in the video	3 (15)	2 (18.2)	2 (9.1)	19 (55.9)	
External voice	7 (35)	3 (27.3)	7 (31.8)	9 (26.5)	
Gender, *n* (%)					
Female	16 (80)	11 (100)	19 (86.4)	31 (91.2)	0.531
Male	1 (5)	0 (0)	0 (0)	0 (0)	
Both	3 (15)	0 (0)	3 (13.6)	3 (8.8)	
Misleading information, *n* (%)	9 (45)	4 (36.4)	17 (77.3)	24 (70.6)	**0.034**
Useful information, *n* (%)	11 (55)	7 (63.6)	5 (22.7)	10 (29.4)	

Bold values indicate the signifcant of $p < 0.05$

Variables are presented as mean ± standard deviation, median (Q1–Q3) or frequency (%) values

Table 4 Pairwise comparison of video sources

	p value					
	Source 2–3	Source 2–4	Source 2–5	Source 3–4	Source 3–5	Source 4–5
Reliability score	0.58	0.028	0.045	0.01	0.014	0.658
Comprehensiveness score	0.966	0.014	0.037	0.031	0.085	0.407
GQS score	0.495	0.013	0.021	0.012	0.018	0.638

and it is used as an information source. There is increasing use of YouTube by patients and healthcare professionals as a source of medical education and medical information. Previous studies have examined YouTube as an information source for cervical cancer [14], myocardial infarct [21], the application of TNF injection in rheumatoid arthritis [11] and rheumatoid arthritis [15]. Basch et al. evaluated the content and comments of mammography videos on YouTube [16]. To the best of our knowledge, there has been no previous study that has examined the quality and content of YouTube videos on the subject of BSE.

There are more than 1 billion YouTube users, and these users watch videos for up to 1 billion hours per day, creating viewing rates in the billions [12]. The videos examined in this study had a total of 85 million views, a total time of more than 7 h, a total of 37,323 likes, 11,362 dislikes and 11,532 comments. This demonstrates that BSE videos on YouTube are extremely popular. However, the reliability and accuracy of the content of videos on YouTube are

unsupervised. Although the reliability, comprehensiveness and GQS scores of the useful videos examined in this study were high, the number of useful videos (*n*: 33) was lower than that of misleading videos (*n*: 54).

When interaction with the videos was examined, no statistically significant difference was determined between the two groups in respect of likes, dislikes and comments. The number of views per day was greater for the videos in the misleading information group (median 58.6, IQR 18.5–298) compared to the videos in the useful information group (median 49.7, IQR 16.3–268) ($p = 0.276$). This demonstrates that viewers can not differentiate between useful and misleading information.

The videos were uploaded by an individual at the rate of 39.1%, and of these 70.6% contained misleading information, and only 2.9% of these videos stated reference sources. When it is taken into consideration that all those who are attempting to access information are not healthcare personnel, these results demonstrate that it is not easy to obtain correct information from watching videos.

Despite the idea that more reliable information can be obtained from the person giving the explanation on the video being a physician, the narrator on the video was a physician in 39.4% of the useful information group videos and in 33.3% of the misleading information group. Although it is thought that a physician as narrator inspires trust, it was observed that the source of many uploads was more important than the narrator in accessing useful information.

Breast cancer is seen in males much more rarely than in females and constitutes < 1% of all breast cancers [22, 23]. Therefore, both genders should know how to perform BSE. Accordingly, YouTube is used by males as an information source about BSE. However, only 1 video was found that was directed at males. A total of 9 videos included approaches targeting both males and females and with emphasis on the fact that males can develop breast cancer, the importance and procedure of self-examination was explained. In the remaining 77 videos, males were excluded with the use of the word "woman" only.

Although majority of YouTube BSE videos are found to be unreliable in our study Tolu et al. analysed the anti-TNF agent injection videos on YouTube and stated that videos were reliable and could be used in patient education [11]. This difference was mostly made by "patient opinion group", and in their study useful information videos were mostly uploaded by professional health care sources. Our study investigated videos for healthy population so that we could not create a patient opinion group. In addition we found that only about one-third of useful videos had been uploaded by universities/professional organisations/non-profit organisations/physicians/physician groups. On the other hand, our results are similar to Singh et al. and Basch et al.'s studies [15, 16].

A limitation of this study is that only English-language videos were examined. A further limitation is that the videos were in order of popularity and evaluation was made on 1 day only, but the order of videos on YouTube can change from day-to-day.

Conclusion

YouTube has started to be preferred more than other written sources to obtain health-related information. The majority of the BSE videos examined in this study had been uploaded by individual users. When it is taken into consideration that the majority of videos were misleading, the conclusion was reached that the government, universities, professional organisations, and non-profit doctors and doctor groups have a serious responsibility to upload more videos to YouTube to help people to reach complete and accurate information.

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Compliance with ethical standards

Conflict of interest The authors declare they have no conflicts of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors. So there is no need for ethical approval.

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