Obesity Surgery (2019) 29:1477–1484
https://doi.org/10.1007/s11695-019-03738-2

ORIGINAL CONTRIBUTIONS

Evaluation of the Reliability, Utility, and Quality of the Information in Sleeve Gastrectomy Videos Shared on Open Access Video Sharing Platform YouTube

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Published online: 1 February 2019

Abstract

Background The internet is a widely used source for obtaining medical information both by patients and physicians. YouTube® is a valuable information resource which can improve the learning experience of both public and medical professionals if appropriately used. In this study, we want to evaluate quality and accuracy of videos about sleeve gastrectomy procedure.

Methods We included the first 100 videos returned by YouTube® search engine in response to "sleeve gastrectomy" keyword query to the study. The popularity of the videos was evaluated with an index called the video power index (VPI). Educational quality of videos was measured using the DISCERN score (DISCERN), Journal of American Medical Association (JAMAS) benchmark criteria, and Global Quality Scores (GQS). The technical quality was measured by Sleeve Gastrectomy Scoring System (SGSS) which was utilized by three bariatric surgeons.

Results The source in 31% of the videos was a patient. The content in 53% of the videos was surgical technique. According to sources, videos uploaded by a university-affiliated physician had significantly higher DISCERN, JAMAS, GQS, and SGSS scores. Videos uploaded by a university-affiliated physician also had lower video power index than videos uploaded by patients. Surgical technique videos had significantly higher DISCERN, JAMAS, GQS, and SGSS scores. Patient experiences and advertisement videos had higher VPI scores. Also, negative correlations were found between video power index and JAMAS, GQS, and SGSS scores.

Conclusions Online information on sleeve gastrectomy is of low quality, and its contents are of unknown source and accuracy. However, educational potential of YouTube® cannot be ignored.

Keywords Obesity · Information · Internet · YouTube · Sleeve gastrectomy · Public education · Patient education · Quality · Video · Continuing surgical education

Introduction

Since 1999, user-generated websites which creates a direct interaction with each user have spread in the internet world. This phenomenon was first named "Web 2.0" by Darcy DiNucci [1]. One of the best examples for "web 2.0" is YouTube®. It is a widely used open access video sharing website and assures to unregistered users to reach unlimited video content, and it also allows registered users to upload an infinite number of videos. Also, users can make comments, like, or dislike videos to express their thoughts or feelings.

Due to the widespread use and easy access to the internet, it has become one of the essential reference resources for health information. However, the diversity of authorship and absence of peer-review process on YouTube® have led to the posting of inaccurate or misleading health information [2, 3].

One of the most searched topics about health issues on the internet is obesity which is the next major epidemiologic challenge facing today's doctors. Obesity has become one of the most critical health issues of the world and became pandemic over a few decades. The prevalence has doubled in adults and children and tripled in adolescents over the past two decades [4]. If secular trends continue, by 2030 an estimated 38% of

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the world's adult population will be overweight, and another 20% will be obese [5]. Bariatric surgical procedures are the only long-standing effective treatment method of morbid obesity [6]. Until recently, the Roux-en-Y gastric bypass was accepted as the standard procedure of morbid obesity [7]. The American Society for Metabolic and Bariatric Surgery (ASMBS) accepted sleeve gastrectomy procedure as an acceptable choice in the surgical treatment of morbid obesity in 2009. After this decision of ASMBS, insurance coverage for this surgical procedure began, and International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) code for laparoscopic sleeve gastrectomy established in 2011 [8]. After these developments, the popularity of sleeve gastrectomy among surgeons has increased [9] and, the desire to get information about this subject was accelerated in the community. Since YouTube® is one of the most important and easy tools that provide rapid access to visual information, it has rapidly responded to these desires of the public, but there are doubts about the reliability of the information in YouTube®.

In this study, we want to evaluate if the popularity of the video correlated with the quality and accuracy as determined by using the recognized quality scoring systems. These are DISCERN questionnaire, Global Quality Score, Journal of American Medical Association benchmark criteria, and video power index which is created to asses both the view and the like ratio of the videos, Sleeve Gastrectomy Scoring System which is designed for more detailed assessment of YouTube® videos in terms of sleeve gastrectomy–specific diagnosis, classification, treatment alternatives, and complications.

Materials and Methods

We performed a search on YouTube® by using the keyword "sleeve gastrectomy" on June 1, 2018. The first 100 videos were analyzed. Videos including any surgical technique, commercial videos, videos recorded by patients, or educational videos were included in the evaluation. We sorted the videos in order of relevance, which is the current YouTube® default. Three bariatric surgeons performing sleeve gastrectomy in routine daily practice assessed the videos. Time since the upload day, the running time, the number of views, comments, and likes/dislikes were determined.

The videos were classified under two main topics based on their source and content. Categories classified according to the source were 1) academic (author/s was/were affiliated with a university), 2) physician (author/s who was/were not affiliated with a university), 3) patient, 4) commercial, 5) non-physician (allied health professionals-therapist, physiotherapist or dietician), and 6) unclassified. Categories classified according to content were 1) surgical technique, 2) information about disease or surgery, 3) patient experience, and 4) advertisement.

We used to assess the educational quality and accuracy of the online content DISCERN questionnaire score (DISCERN), Journal of the American Medical Association benchmark criteria (JAMAS), and Global Quality Scores (GQS). We also used a Sleeve Gastrectomy Scoring System (SGSS) in the evaluation of the medical and technical quality of information.

Video Power Index To asses both the view and the like ratio of the videos we chose "Video power index" (VPI) which was first described by Erdem MN et al. The formula calculated video power index: like ratio x view ratio/100 [10].

DISCERN Questionnaire To determine the quality of the information and offered treatment choices, we used the DISCERN questionnaire (DISCERN) which was developed by professionals at Oxford University in the UK [11]. This questionnaire system varies from 0 to 80 points and has three sections including 16 questions, each question is rated on a 5-point scale ranging from No to Yes; 80: the quality criterion has been wholly fulfilled; 32–64: the quality criterion has been partially fulfilled; 16: the quality criterion has not been fulfilled at all.

Global Quality Score Bernard et al. first described Global Quality Score (GQS) which is a five-point scale. This scoring system was used to assess the educational value of each video (Table 1) [12].

Journal of American Medical Association Benchmark Criteria The accuracy, utility, and reliability of each video source were evaluated according to Journal of American Medical Association benchmark criteria (JAMAS) ranges from 0 to 4 and suggested by Silberg et al. 1 point: insufficient data about video source, 2–3: partially sufficient data about video source, 4: Completely sufficient data about video source (Table 2) [13].

Sleeve Gastrectomy Scoring System Since DISCERN, GQS, and JAMAS scoring systems do not provide a specific assessment of analyzed sleeve gastrectomy related videos, for more detailed evaluation of YouTube® videos in terms of sleeve

Table 1 Global Quality Score (GQS)

1. Poor quality; very unlikely to be of any use to patients
2. Poor quality but some information present; of very limited use to patients
3. Suboptimal flow, some information covered but important topics are missing; somewhat useful to patients
4. Good quality and flow, most important topics covered; useful to patients.
5. Excellent quality and flow; highly useful to patients

Table 2 The Journal of American Medical Association (JAMA) benchmark criteria

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Currency: Dates that content was posted and updated should be indicated.

gastrectomy–specific diagnosis, classification, treatment alternatives, and complications, three surgeons routinely performing sleeve gastrectomy in daily practice utilized a Sleeve Gastrectomy Scoring System (SGSS). We modified this scoring system from the guidelines of American Heath Association/American College of Cardiology/The Obesity Society and American Society for Metabolic and Bariatric Surgery [14, 15] (Table 3). Based on the SGSS checklist, each of the 24 criteria was given 1 point if presented orally or written in the video. K-means clustering analysis was used to classify the quality of videos according to SGSS scores and videos are divided into three groups as poor quality (SGSS point < 1.76), suboptimal quality (SGSS point between 1.76 and 10.6) and good quality (SGSS point > 10.6). All scorings were performed separately by three surgeons. Videos with different scores were reassessed until a consensus was reached.

Statistical Analysis

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, UT, USA) program was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, first quadrant, third quadrant, frequency, percentage, minimum, maximum) were used when study data were evaluated. Average distributions of quantitative data were tested with the Shapiro-Wilk test and graphical tests. Independent group *t* test was used in the comparison of two groups of quantitative variables with normal distribution. Mann-Whitney U test was used to compare the two groups of quantitative variables without normal distribution. The Kruskal-Wallis test and the Dunn-Bonferroni test were used for two-way intergroup comparisons of quantitative variables with no normal distribution. Spearman correlation analysis was used to evaluate the relationships between quantitative variables. To find groups in the data, with the number of groups represented, K-means Clustering was used. Statistical significance was accepted as $p < 0.05$.

Table 3 Sleeve Gastrectomy Scoring System

A—Preoperative evaluation[a]
1—Was the age of the patient specified on video?
2—Was the gender of the patient specified on video?
3—Was the body mass index value of the patient specified on video?
4—Was preoperative upper gastrointestinal endoscopy findings specified on video?
5—Was the patient's comorbid diseases stated on video?
6—Was preoperative abdominal imaging findings specified on video?
7—Was preoperative psychiatric evaluation findings specified on video?
8—Has he/she made a diet before surgery and was any information about this topic specified on video?
9—Was information about patient's previous surgery history stated?
10—Was any medical treatment about deep vein thrombosis prophylaxis specified on video?
B—During surgery
1—Was the port locations specified on video?
2—Was the diameters of the ports specified on video?
3—Was the patient's position specified on video?
4—Was the left diaphragmatic crus seen on video?
5—Was the distance from the stapler's starting point to the pylorus specified on video?
6—Was the stapler kind/feature specified on video?
7—Was any other material/s used to enforce stapler line (Tissel, suture, omentoraphé, etc.) on video?
8—Was the usage or not usage of drain specified on video?
9—Has it been specified whether the leak test (perioperative) was performed or not on video?
10—Was bougie used or not on video?
C—After surgery
1—Was whether the post-operative complication developed or not specified on video?
2—Was the hospitalization period or discharge time specified on video?
3—Was the oral diet start day specified on video?
4—Was any radiological examination performed for post-operative leak examination and was any information about this topic specified on video?

[a] Questions were answered as yes or no, yes = 1-point, no = 0-point

Results

According to the video source, 31% of the videos are classified as patient sourced. Surgical technique is the most dominant video content, and 43% of the videos are in English (Table 4).

The mean VPI, DISCERN, JAMAS, GQS, and SGSS scores of all 100 videos are 31,254.42, 26.24, 0.71, 1.71, and 3.09 respectively (Table 5).

DISCERN, JAMAS, GQS, and SGSS scores of academic sourced videos were significantly higher than the patient sourced videos ($p < 0.001$, $p < 0.001$, p: 0.001, $p < 0.001$, respectively). However, VPI score of patient sourced videos was significantly higher than academic and physician sourced videos ($p < 0.001$, p: 0.003, respectively) (Table 6).

In the evaluation based on content, surgical technique videos had significantly higher DISCERN, JAMAS, GQS, and SGSS scores than patient experience videos ($p < 0.001$,

Table 4 Descriptive data of the videos

		n	%
Video source	Academic	23	23.0
	Patient	31	31.0
	Non-physician	8	8.0
	Commercial	6	6.0
	Physician	28	28.0
	Unclassified	4	4.0
Video content	Surgical technique	53	53.0
	Information about disease/surgery	11	11.0
	Patient experience	31	31.0
	Advertisement	5	5.0
Language	English	43	43.0
	Soundless	31	31.0
	Italian	17	17.0
	Turkish	5	5.0
	Spanish	4	4.0
		Min–Max	Mean ± SD (Median)
Time since upload (days)		4–2890	904.92 ± 712.89 (666.5)
Run time (seconds)		48–8543	1592.24 ± 1539.75 (1306)
View		12–597,774	38,768.99 ± 94,854.73 (2333.5)
Like		0–40,000	769.15 ± 4295.58 (20)
Dislike		0–1100	33.41 ± 128.26 (1)

$p < 0.001$, $p < 0.001$, p: 0.001, respectively). VPI score of patient experience and advertisement videos was significantly higher than surgical technique videos ($p < 0.001$, p: 0.025, respectively) (Table 6).

A negative correlation found between the run time of the videos and VPI scores (r: − 0.445, $p < 0.001$). Also, there was a positive correlation between run time of the videos and DISCERN, JAMAS, GQS, and SGSS scores (r: 0.354, $p < 0.001$; r: 0.453, $p < 0.001$; r: 0.401, $p < 0.001$; r: 0.769, $p < 0.001$, respectively). Assessment of video like/dislike numbers revealed the increasing number of likes had a negative correlation with DISCERN, JAMAS, GQS, and SGSS scores (Table 7).

Negative correlations were found between VPI and JAMAS, GQS and SGSS (r: − 0.340, $p < 0.001$; r: − 0.303, p: 0.002; r: − 0.484, $p < 0.001$, respectively) scores in assessment relation between scores (Table 8).

Discussion

This study revealed that the most popular videos about sleeve gastrectomy on YouTube® have the least academic and educational quality.

Recent years, increasing in the daily number of patients who admitted to the outpatient clinic after doing online research on the internet has been drawing the attention and, YouTube® is a growing online video platform which creates easy access to online videos. Its popularity among patients or medical professionals has been growing [16]. Achieving the right information from reliable sources increases patient satisfaction and may improve the treatment results [17, 18]. Also, the number of bariatric surgery procedures has increased, and sleeve gastrectomy has become the most preferred surgical procedure in the United States of America and Asia-Pacific region [19]. The skyrocketing popularity of internet which eases to reach oral, written, and visual open access information and increasing interest in sleeve gastrectomy procedure forced people to get information over the internet (Fig. 1). Since the accuracy of online information is variable and uncontrolled, the situation may mislead the patients and impair

Table 5 Information on scores

	Min–Max	Mean ± SD (Median)
VPI	0–239,109,600	3,145,442.24 ± 24,205,774.28 (548.4)
DISCERN	16–80	26.24 ± 17.84 (1)
JAMAS	0–4	0.71 ± 1.04 (0)
GQS	1–5	1.71 ± 1.10 (1)
SSGS	0–24	3.09 ± 4.16 (0.5)

Table 6 Comparison of scores according to descriptive characteristics

	VPI	DISCERN	JAMAS	GQS	SGSS
Video source					
Academic	100.71 (3.00, 2893.68)	48 (32, 64)	2 (1, 3)	3 (2, 4)	6 (4, 9)
Patient	42,453.56 (2401.00, 279,760.75)	16 (16, 16)	0 (0, 0)	1 (1, 1)	0 (0, 0)
Non-physician	11,465.29 (1364.88, 260,218.29)	16 (16, 16)	0 (0, 0)	1 (1, 1)	0 (0, 0)
Commercial	441,117.97 (473.20, 39,801,280.00)	16 (16, 16)	0 (0, 0)	1 (1, 1)	0 (0, 0)
Physician	6.36 (1.85, 85.90)	16 (16, 40)	1 (1, 1)	2 (1, 2)	5 (3, 7.5)
Unclassified	0 (0, 0.92)	16 (16, 16)	0 (0, 0)	1 (1, 1)	4 (4, 4.5)
Video content					
Surgical technique	9.51 (1.82, 164.90)	32 (16, 48)	1 (1, 2)	2 (1, 3)	5 (4, 8)
Information about disease/surgery	6095.48 (1231.68, 173,788.66)	16 (16, 40)	0 (0, 0.5)	1 (1, 2)	0 (0, 0)
Patient experience	38,394.72 (1334.80, 177,866.04)	16 (16, 16)	0 (0, 0)	1 (1, 1)	0 (0, 0)
Advertisement	873,600.26 (473.20, 39,801,280)	16 (16, 16)	0 (0, 0)	1 (1, 1)	0 (0, 0)
p	< 0.001***	< 0.001***	< 0.001***	< 0.001***	< 0.001***

Kruskal-Wallis test, reported as median (first quartile, third quartile)

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

the balance between information and knowledge in the clinician-patient relationship [20].

The study of Keelan et al. was the first of YouTube® evaluating studies which were about the quality of videos about immunization [21]. After Keelan et al., many other studies aimed to assess the quality and accuracy of medical videos uploaded this open access video platform [22–26]. Also, many studies created a question mark about the quality and accuracy of online videos or video platforms targeting medical knowledge. The mean DISCERN, JAMAS, GQS, SGSS scores in the presented study are 26.24/80, 0.71/4, 1.71/5, and 3.09/24 respectively. This low score rates suggest the accuracy and quality of YouTube® videos about sleeve gastrectomy are far from being informative and, these results are consistent with previous studies [9, 22, 27–31].

Rightfully informing and convincing to the correct treatment the patients is more challenging after getting misinformation on the internet. In the presented study, VPI scores of patient sourced videos, about patient experience and advertisement videos (42,453.56, 38,394.7, 873,600.26 respectively), are higher than videos having more reliable sources (Academic, physician sourced and surgical technique videos) (p: 0.003, $p < 0.001$, p: 0.025 respectively). But despite its high popularity, DISCERN, JAMAS, GQS, and SGSS scores of patient sourced videos (1, 0, 1, 0 respectively), about patient experience (1, 0, 1, 0 respectively) and advertisement videos

Table 7 Assessment of the relationship between quantitative variables and scores

		VPI	DISCERN	JAMAS	GQS	SGSS
Time since upload	r	0.217	− 0.050	0.013	0.012	− 0.012
	p	0.030*	0.620	0.902	0.909	0.908
Run time	r	− 0.445	0.354	0.453	0.401	0.769
	p	< 0.001***	< 0.001***	< 0.001***	< 0.001***	< 0.001***
View	r	0.976	− 0.159	− 0.327	− 0.287	− 0.464
	p	< 0.001***	0.115	0.001**	0.004**	< 0.001***
Like	r	0.976	− 0.208	− 0.360	− 0.312	− 0.510
	p	< 0.001***	0.038*	< 0.001***	0.002**	< 0.001***
Dislike	r	0.895	− 0.208	− 0.361	− 0.312	− 0.421
	p	< 0.001***	0.039*	< 0.001***	0.002**	< 0.001***

r, Spearman's rho *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 8 Determining the relationship level between scores

		VPI	DISCERN	JAMAS	GQS	SGSS
VPI	r	1.000				
	p	–				
DISCERN	r	− 0.193	1.000			
	p	0.055	–			
JAMAS	r	− 0.340	0.617	1.000		
	p	< 0.001***	< 0.001***	–		
GQS	r	− 0.303	0.781	0.857	1.000	
	p	0.002**	< 0.001***	< 0.001***	–	
SGSS	r	− 0.484	0.497	0.608	0.581	1.000
	p	< 0.001***	< 0.001***	< 0.001***	< 0.001***	–

r, Spearman's rho; $^{**}p < 0.01$, $^{***}p < 0.001$

(1, 0, 1, 0 respectively) were lower than academic videos ($p < 0.001, p < 0.001, p$: 0.015 respectively). This finding suggests that less quality is equal to more views and ratings on the internet. Since the physicians do not have a chance to correct or arrange the misinforming information on the internet, it is necessary to get at least the knowledge about how the online world influences the patients. Erdem H et al. evaluated the bariatric surgery videos on YouTube® and, they conclude that 24.6% of videos were beneficial, 53.7% of videos were useful, but in contrast with their study, we have concluded that YouTube® sourced videos about sleeve gastrectomy are far from accurate information and educational usage [10]. Erdem et al. modified and used a usefulness score which was originally described by Lee at al. for analyzing gallstone disease. We think, the use of a single scoring system and not to create or use a scoring system specific to bariatric surgical procedures limited the accuracy of their study [24].

According to content, more than half of the videos were surgical technique videos. The VPI was 9.51 which was the lowest score, SGSS score was 5, DISCERN was 32, JAMAS was 1, GQS was two which all were the highest in this group. Nineteen of surgical technique videos were uploaded by a physician affiliated with a university, 27 by a physician not affiliated with a university, four by unclassified source. When videos were reviewed based on their sources, DISCERN, JAMAS, GQS, and SGSS scores are higher in academic (48, 2, 3, 6 respectively) and physician sourced (16, 1, 2, 5 respectively) groups but an interesting finding was that despite its highest SGSS score, score of academic sourced videos was only 6/24 points. We argue that this finding of low SGSS score in academic sourced videos was indirect evidence of low quality and accuracy of videos about sleeve gastrectomy even if a physician affiliated with a university uploaded them. A systematic review analyzing healthcare information on YouTube® was published by Madathil et al. in the year 2014. They focused on 18 studies and concluded as YouTube® contains many anecdotal, low-quality, misleading information [22]. Their findings are compatible with our results.

In this study, we found there was a negative correlation between run time of the videos and VPI scores (r: − 0.445, $p < 0.001$), and a positive correlation between run time of the videos and DISCERN, JAMAS, GQS, and SGSS (r: 0.354, $p < 0.001$; r: 0.453, $p < 0.001$; r: 0.401, $p < 0.001$; r: 0.769, $p < 0.001$, respectively) scores were found. Also, the increasing number of likes had a negative correlation of DISCERN,

Fig. 1 Increase in search keyword "sleeve gastrectomy" on YouTube® (https://trends.google.com)

JAMAS, GQS, SGSS scores. Another interesting finding was that there was a negative correlation between VPI and JAMAS, GQS and SGSS scores (r: −0.340, $p < 0.001$; r: −0.303, p: 0.002; r: −0.484, $p < 0.001$, respectively). These findings suggest YouTube® users had a favorable response to less optimal or less educational videos and less desire to watch long run time videos which have potential to be more accurate and reliable. Our findings support the conclusion of Erdem MN et al. and Desai et al. [10, 16] which is the "attractivity" or the "readability" of the online content has as much impact as the content itself on the viewing rates [27, 32]. Previous studies taking topic the information about cardiopulmonary resuscitation or influenza vaccination on the internet defined a negative correlation between video accuracy and YouTube® user engagement [2, 33]. So, the low educational/academic quality videos were more worth to read/watch, whereas videos with higher academic scores were not found "worth to read" by the YouTube® users and it seems neither educational quality nor accuracy does not affect public engagement.

The primary limitation of our study was analyzing only the first 100 videos on YouTube® upon searching the keyword "sleeve gastrectomy", yet, a known fact that most people do not read more than one or two pages of searching results they find on the internet [34]. Therefore, only the first 100 YouTube® videos were evaluated in this study. Another limitation was only the videos on YouTube® upon searching the keyword "sleeve gastrectomy" were scored in this study; accesses from other medical-related websites were excluded from the study. Another limitation was that; YouTube® searching was done in YouTube® default settings which may vary by geographical location or by other undisclosed factors. Despite all limitations, this study settled on an objective methodology to evaluate videos for educational content and accuracy. Only a limited number of studies have objectively investigated educational content or accuracy, and in this study, authors avoided grading scales such as "fair," "poor," or "very useful," "useful," "not useful."

Conclusion

This study shows less accurate and less reliable videos are more favorable by open access video platform YouTube® users. Also, open access nature of YouTube® complicates filter process of video quality and accuracy. Health professionals prepared only half of the videos, and this suggests that the remaining videos could be potentially misleading, so this free and unreliable data may misinform and mislead the patients which create a problematic patient-physician relation. Despite all its disadvantages, educational value or potential of YouTube® cannot be ignored. More healthcare information videos refined by a serious filtering/professional review process created by health professionals may increase public health awareness, and the internet can be a useful tool for delivering this right information to the public.

Acknowledgments The authors of this manuscript would like to thank Associated Professor H. Yener Erken, M.D. for his expert advice in this project.

Authors' Contributions MFF collected the information, reviewed the literature, and wrote the manuscript. AK and UE collected the information. AG critically reviewed the manuscript and approved the final form. All authors read and approved the final manuscript.

Funding There is no funding related to this article.

Compliance with Ethical Standards

Competing Interests The authors declare that they have no conflict of interest.

Ethical Approval Statement For this type of study, formal consent is not required.

Informed Consent Statement Does not apply.

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