

Evaluation of Breast Cancer Videos on Youtube in the Arab World

Georges Ayoub (✉ georges-ayoub@outlook.com)

Department of Hematology-Oncology, Faculty of Medicine, Saint-Joseph University of Beirut, Lebanon.

<https://orcid.org/0000-0002-1694-6779>

Elie Chalhoub

Universite Saint-Joseph

Ghassan Sleilaty

Universite Saint-Joseph

Hampig Raphael Kourie

Universite Saint-Joseph

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Abstract

Background

Patients are increasingly using YouTube™ as a source of information on Breast cancer, the most frequent cancer among women. Educating patients is highly important to reduce mortality rates. This study aims to evaluate, for the first time, Breast Cancer Videos on YouTube™ in the Arab world that hosts their highest use.

Methods

In this cross-sectional study, the most viewed 60 videos were evaluated for global quality (GQS score), reliability (modified DISCERN score), usefulness (content-specific score), and misleading claims. Videos' power index, popularity, duration, and viewers' interaction were assessed. Sources (professional/ non-professional) and speakers (physician/ non-physician) were categorized.

Results

The median Global Quality (3/5), Reliability (2/5), and Usefulness scores (4/11) were overall low. Out of all videos, the speaker was a physician in 32% and misleading information was found in 42%. Although professional source videos (45%) were less viewed, they were less misleading, of higher quality, reliability, and usefulness than non-professional source videos (55%). Source categories did not affect viewers' interaction, video power index, nor duration. While Symptoms (55%) were discussed the most, genetic counseling (13%) and prevention (20%) were scarcely mentioned; professionals were more likely to highlight early diagnosis importance.

Conclusions

YouTube™ is poorly informational on breast cancer and may be inaccurate in the Arab world where highly used. Although professional uploaders' videos tend to be more adequate, they are of lower quantity and popularity. Governments and physicians should upload more intelligibly informational videos, guide the public for accurate sources, and encourage regulations.

Background

Breast cancer is the most frequent cancer among women, impacting 2.1 million women each year, and also causes the greatest number of cancer-related deaths among women. It is increasing particularly in developing countries where the majority of cases are diagnosed in late stages [1]. Educating patients accurately, on early diagnosis and advances in treatments, is of high importance for its ability to substantially reduce mortality rates [2].

With the growing popularity of online platforms, using the Internet as a source to access health-related information has increased among the population [3–5]. Particularly, YouTube™ users constitute 95% of all

internet users and it represents one of the most popular social network sites for sharing video content. The number of videos containing medical information is increasing [6–8]. Similarly, patients are increasingly referring to YouTube™ health-related videos as it represents an easily accessible education tool [9]. The case is especially true with regard to breast cancer [10, 11]. While the rates of Internet usage among breast cancer patients have been reported between 42% and 49%, the information obtained is not discussed with their physicians [11, 12].

However, the medical content available on YouTube™ is not properly examined and may be inaccurate, nay misleading. Previous studies have examined YouTube™ videos on different health issues such as food poisoning, oral leukoplakia, cervical cancer, prostate cancer, and rheumatoid arthritis [13–17]. While some information related to certain topics has been found to be useful, other information has been found to be incomplete and questionable. The dissemination of such information can mislead the population into behaviors that are harmful to health [7].

According to Google Trends, a platform that assesses the popularity of online topics throughout the globe, Breast cancer is the most popular cancer on YouTube™ and is being searched for the most by the Arab population (Fig. 1) [18, 19].

To date, no study has been carried out to examine any medical information on YouTube™ in the Arab World. Particularly, there is no previous study to investigate the Arabic content of breast cancer-related videos in the Arab world where the subject is of particular interest to internet users. Given that it is essential to do so, this study aims to report an evaluation of the content, quality, reliability, and usefulness of Videos related to breast cancer on YouTube™ in the Arabic language. Additionally, findings could serve as a guide for healthcare providers, awareness campaigns, and policy regulations.

Methods

In this cross-sectional study, YouTube™ was searched on the 20th of May 2020, using the keyword “Breast Cancer” in Arabic (سرطان الثدي). Considering that more than 95% of users performing a search on YouTube™ do not watch more than the first 100 videos provided, the first 100 videos were selected for preliminary analysis [20–25]. After sorting videos by “view count” and saving them in a playlist, the following information was extracted from each video: upload date, number of views, number of likes, number of dislikes, and duration. Based on these data, Video Power Index was calculated using the formula: $[\text{number of likes}/(\text{number of likes} + \text{dislikes})] \times 100$. The Viewers Interaction was assessed via the formula: $[(\text{number of likes} - \text{number of dislikes})/\text{number of views}]$. As videos were uploaded on different dates, the viewing rate was examined by dividing the number of views by the number of days since the video was uploaded.

The inclusion criteria were: (1) Arabic videos; (2) videos available on the 20th of May 2020; (3) videos related to female breast cancer. The exclusion criteria are: (1) non-Arabic videos; (2) advertisements; (3) music clips; (4) videos not related to breast cancer such as music, gaming, or others; (5) duplicate videos.

The videos were separated into two groups according to the source of the upload: Professional source (government/news agencies/university channels/non-profit-physician) and Non-professional source (stand-alone health channels, individuals).

Included videos were evaluated for overall quality (GQS score – Table 1), reliability (modified DISCERN score – Table 1), and usefulness (Table 1). Additionally, videos that shared any information not verified by the American Society of Cancer [26] were classified as Misleading.

The GQS score (Table 1) was proposed by Bernard *et al.* to assess the overall quality of the video. It is a five-point scale based on the quality of information, the flow and ease of use of the information present online [27].

Table 1 - Evaluation tools for global quality, reliability, and usefulness of the YouTube™ videos on Breast Cancer

Global quality scale (5-points scale)	Poor quality, poor flow, most information missing, not helpful for patients
	Generally poor, some information given but of limited use to patients
	Moderate quality, some important information is adequately discussed
	Good quality good flow, most relevant information is covered, useful for patients
	Excellent quality and excellent flow, very useful for patients
Reliability (1 point per question if answered yes)	Are the explanations given in the video clear and understandable?
	Are useful reference sources given? (publication cited, from valid studies)
	Is the information in the video balanced and neutral?
	Are additional sources of information given from which the viewer can benefit?
	Does the video evaluate areas that are controversial or uncertain?
Usefulness Score	Definition (1 point if mentioned)
	Statistics and Epidemiology (1 point if mentioned)
	Symptoms (1 point if partially mentioned, 2 points if fully mentioned)
	Risk Factors (1 point if partially mentioned, 2 points if fully mentioned)
	Prevention (1 point if mentioned)
	Genetic Counseling (1 point if mentioned)
	Screening and Diagnosis (1 point if partially mentioned, 2 points if fully mentioned)
	Treatment (1 point if mentioned)

The reliability of the videos was evaluated by a questionnaire proposed by Singh et al. [14] (a modified 5-point DISCERN adapted from the original DISCERN tool [29]). For each aspect addressed, videos receive 1 point, with possible scores ranging from 0 to 5 points (Table 1).

The evaluation of the videos' usefulness was based on the amount of accurate information on important topics related to Breast Cancer. The usefulness score (Table 1) is a customized content-specific score created by the team. The team considered the information available on the "Breast Cancer Basic Information" section of the CDC website a gold standard [29]. Scores ranged from 0 to 11. Based on the sum of the points, the videos were classified as: Not Useful (score 0–2), Somewhat Useful (score 3–5), Moderately Useful (score 6–8), or Very Useful (score 9–11).

The evaluation of all videos was performed independently by two examiners (GA and EC). After comparing the data, discrepancies were discussed with a third examiner (HRK).

The analysis was run using IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, NY). Data distribution was assessed using a Shapiro–Wilk test. Descriptive statistics were reported including medians (1st quartile–3rd quartile) for continuous variables and percentages for categorical variables. Mann-Whitney U test was used for the numerical variables, while correlation analysis was performed using Pearson correlation analysis. For the comparison of categorical variables, the Chi-square was used. A two-tailed p -value < 0.05 was deemed statistically significant.

Results

Using the keyword of "Breast Cancer" in Arabic (سرطان الثدي), the first 100 most viewed videos on YouTube™ were examined, of which 60 were included in the study for further analysis. A total of 40 videos were excluded as they were irrelevant (n: 27), not in Arabic (n: 7), music videos (n: 3), advertisement (n: 1), or a duplicate (n: 1).

Among the 60 included videos, 27 videos (45%) were uploaded by a professional source as the other 33 videos (55%) were uploaded by a non-professional source. The speaker was a physician in 19 videos (32%). Additionally, 11 videos (18%) were made by patients for a cancer testimonial purpose (personal reports). The median duration of the videos was 5.95 minutes (2.94–11.99). The 60 videos have been viewed a total of 21'514'441 times; the median number of views per video is 203'146 views (210 views per day). At least one misleading information was found in 25 videos (42%). The Distribution of Videos by country source is showed in Fig. 3. The median GQS, Reliability, and Usefulness scores of the videos were 3 (2–3), 2 (2–3), 4 (2–5) respectively. While only 3 videos (5%) were classified as very useful, 22 videos (37%) were not useful, 25 (41%) were somewhat useful, and 10 (17%) were moderately useful.

The classification of videos according to source category with details of other characteristics is given in Table 2. There was no significant difference between source category and duration, viewers interaction, or video power index ($p = 0.637$, $p = 0.081$, $p = 0.490$, respectively). A statistically significant difference was determined in favor of the non-professional source in respect of the viewers per day ($p < 0.05$). However,

videos uploaded by a professional source had significantly higher GQS score, reliability score, and usefulness score ($p < 0.05$).

Table 2
The classification of videos according to the source category

	Professional Source	Non-professional Source	P-value
Number of Videos	27 (45%)	33 (55%)	-
Views	163'454 (71'615 - 340'539)	327'488 (128'572 - 567'351)	0.017
Views per day	123 (68.8-271.2)	320 (71-595.8)	0.001
Duration in minutes	6.57 (2.78-16.38)	5.03 (2.98-10.42)	0.637
Viewers Interaction	0.47 (0.2-0.6)	0.63 (0.3-1.4)	0.081
Video Power Index	90 (89-93)	93 (87-94)	0.490
Global Quality Scale	3 (3-4)	2 (1-3)	0.007
Reliability Score	2 (2-3)	2 (2-2)	0.003
Usefulness Score	4 (2-6)	3 (2-4)	0.001
Misleading Videos	4 (15%)	21 (64%)	0.001
Physician Speaker	14 (52%)	5 (15%)	0.002
<i>Variables are presented as median (Q1-Q3) or frequency (%) values; Bold values indicate the significance of $p < 0.05$</i>			

The frequency of misleading videos was significantly higher in the Non-professional source group (64%) than in the professional source group (15%) ($p < 0.05$). Non-physician speakers shared significantly more misleading information (56%) than Physician speakers (11%) ($p < 0.05$). While a Physician was speaking in 52% of the videos uploaded by a professional source, the number is significantly lower (15%) in the videos uploaded by a non-professional source group ($p < 0.05$).

The duration of the videos did not influence the scores ($p = 0.200$, $p = 0.088$, $p = 0.244$) nor the number of viewers per day ($p = 0.153$). However, it was positively correlated with viewers' interaction ($p < 0.05$). While both of the GQS and the usefulness scores were negatively correlated with viewers per day ($p < 0.05$), the reliability score was not ($p = -0.254$).

The distribution of breast cancer information among the videos according to the source category is shown in Fig. 4. The Symptoms topic was discussed the most (55%). However, genetic counseling concept and basic prevention measures were only mentioned in 13% ($n: 8$) and 20% ($n: 12$) of the videos.

Discussion

To the best of our knowledge, this study is the first in the literature to evaluate YouTube™ videos in the Arab world in general, on the topic of Breast Cancer in particular. Given the high prevalence of breast cancer, patients are expected to seek information about the subject. According to Google Trends, a platform that assesses the popularity of online topics throughout the globe, Breast cancer is the most popular cancer on YouTube™ [18]. Of all countries, the Arabic-speaking countries are searching the most for breast cancer on YouTube™ (Fig. 1) [18]. This might be particularly due to the culturally sensitive nature of the inquiry in a conservative environment; other reasons may include distrust in the healthcare system, lack of information providers, and a high prevalence of the disease [19]. The Arab world is made up of 19 countries, a combined population of 420 million people, all of which list Arabic as their official language [30]. While breast cancer incidence rates in Arab women have increased during the last 24 years, women are still being diagnosed with Breast Cancer at more advanced stages of the disease [31, 32]. However, early diagnosis and treatment are associated with a reduction in negative outcomes caused by breast cancer [33]. For this purpose, providing the population with accurate information on breast cancer plays a particularly important role.

Eight of each ten patients seek the web for health-related information [34]. Despite YouTube™ being an easily accessible tool for patients' cancer education, the scientific accuracy of the videos is not regulated, and it is known that laypersons are not able to filter out misleading information [7].

In a study by Isil Yurdaisik, the evaluation of the English content of the most 50 viewed breast cancer-related videos on YouTube™ stated an insufficiency in the quality and the scientific accuracy of the videos [35]. However, our study examined a higher number of videos in a different language that is familiar to the population to which breast cancer is of higher interest on YouTube™ [18]. Besides, our study used more evaluation tools and has closely investigated the distribution of the information provided on the different aspects of breast cancer (Fig. 3).

In our study, the high number of total views (21'514'441) emphasizes the popularity of the subject. However, the videos evaluated were poorly reliable and their content is poorly useful for patients. Their global quality was generally poor to moderate.

Interestingly, videos uploaded from a professional source were more useful for patients, of higher quality, more reliable, and less misleading than those uploaded from a non-professional source. Nevertheless, videos uploaded from a non-professional source tended to be more popularly viewed despite being of lower quality. Reasons may be due to the complexity of medical language used by physicians, the attractive feature of controversial information, and the inability of patients to discern useful information. That being said, healthcare providers, governments, and universities should be encouraged to upload more videos to help people to reach complete and accurate information. The healthcare providers should urge their patients to check the source of their online information and guide them to trustful sources from which they could benefit. Moreover, they are recommended to use a simplified language in an attempt to make the accurate information given more intelligible.

Different rates of source categories have been reported in studies on different topics in the literature. In a study by Gokcen et al. evaluating YouTube™ videos about disc herniation, physicians uploaded more videos (48%) than in our study [36]. However, similar to our study, other studies have reported lower rates [35, 37]. The differences might be due to the topic in question, as cancer topics remain more controversial to and discussed by laypersons than other diseases.

Alarmingly, a significant portion of videos (42%) shared scientifically inaccurate information such as inadequate screening protocols, disproven risk factors and treatment options. Although misleading information was mostly shared by non-professional sources (individuals and stand-alone health channels), more than half of the videos belonged to that source category. For this purpose, policy makers should be encouraged to develop strategies and regulations in order to hinder the spread of misleading information [38].

Tolu et al. claimed in their study that the anti-TNF agent injection videos on YouTube™ were reliable and could be used in patient education [39]. A study by Mengi et al. argued that YouTube™ is a promising source of information on food poisoning [16]. However, in a study by Sahin et al., the authors concluded that YouTube™ may not be a suitable educational source for colorectal cancer patients [40]. Similarly, in a study on prostate cancer by Corey et al., YouTube™ content was found to be inaccurate [24]. The results of this study support the raise of concerns about the quality and accuracy of cancer content on YouTube™ and extend them to the Arab World, where no previous study has evaluated any medical information on YouTube™ to date.

Although the non-professional source and non-physician speaker videos shared a poor amount of information regarding all the topics in general, they shared particular interest on Breast cancer symptoms. However, professional source and physician speaker videos have shed more light on the screening and early diagnosis protocols. Even though more than half of the videos discussed the symptoms of breast

cancer adequately, early diagnosis before the stage of symptoms is associated with a substantial reduction in negative outcomes caused by breast cancer [26, 29].

Despite being very poorly discussed on YouTube™, basic prevention measures, such as maintaining a healthy lifestyle, are known to lower the risk of the disease [26, 29]. Although inherited genetic mutations account for 10–15% of breast cancer cases, mutation carriers or at-risk patients are subject to tailored screening and treatment guidelines [41]. Screening this subgroup of patients in the same way of not-at-risk patients is a harmful practice [41]. Of all videos, only 13% informed viewers about this life-saving concept. The analysis of breast cancer content on YouTube™ should serve as a reminder for information providers to not let down other important aspects of the disease.

A limitation of this study, as with all cross-sectional studies, is the limiting feature of a one data collection point. As YouTube™ is in a dynamic state, the videos with the most views may change over time.

Conclusions

In conclusion, YouTube™ serves as a source of information for the population on breast cancer, especially in the Arab World where the topic is of particular interest to users. However, the information provided is of poor quality and may be inaccurate. Although professional source videos tend to be more adequate, they are of lower quantity and popularity. Governments and healthcare providers should upload more intelligibly informational videos, guide the patients for the accurate sources, and encourage regulations.

Abbreviations

GQS

Global Quality Scale; CDC:Centers for Disease Control and Prevention

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated during and analyzed during the current study are available in the Figshare repository, <https://figshare.com/s/5a82ed580a6aa1ad4eef>

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

All authors were involved in the conception and design of this study. GA and EC conducted the search, screened all videos for eligibility, and performed data extraction. GA, EC, and HRK performed quality assessments, analyzed, and interpreted the data. GS performed the statistical analysis. GA and EC wrote the drafts of the manuscript and all other authors critically revised the different versions of the manuscript. Moreover, all authors were involved in discussing the results and interpreting the findings. All authors read and approved the final manuscript.

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References

- [1] WHO. Breast cancer. World Health Organization [Internet]. 2018 Sep 12; Available from: <https://www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/>
- [2] Elmore JG, Armstrong K, Lehman CD, Fletcher SW. Screening for Breast Cancer. *JAMA*. 2005;293(10):1245–56.
- [3] VELASCO E, AGHENEZA T, DENECKE K, KIRCHNER G, ECKMANNS T. Social Media and Internet-Based Data in Global Systems for Public Health Surveillance: A Systematic Review. *Milbank Quarterly*. 2014 Mar;92(1):7–33.
- [4] Amante DJ, Hogan TP, Pagoto SL, English TM, Lapane KL. Access to Care and Use of the Internet to Search for Health Information: Results from the US National Health Interview Survey. *Journal of Medical Internet Research*. 2015 Apr 29;17(4):e106.
- [5] Powell J, Inglis N, Ronnie J, Large S. The Characteristics and Motivations of Online Health Information Seekers: Cross-Sectional Survey and Qualitative Interview Study. *Journal of Medical Internet Research*. 2011 Feb 23;13(1):e20.
- [6] Raikos A, Waidyasekara P. How Useful Is YouTube in Learning Heart Anatomy? *Anatomical Sciences Education*. 2013 Apr 5;7(1):12–8.
- [7] Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare Information on YouTube: A systematic Review. *Health informatics journal*. 2015;21(3):173–94.

- [8] Karlsen R, Borrás-Morell J-E, Fernández-Luque L, Traver-Salcedo V. A Domain-based Approach for Retrieving Trustworthy Health Videos from YouTube. *Studies in Health Technology and Informatics*. 2013;192:1008.
- [9] YouTube. Press [Internet]. YouTube. 2019. Available from: <https://www.youtube.com/intl/en-GB/yt/about/press/>
- [10] McHugh SM, Corrigan M, Morney N, Sheikh A, Lehane E, Hill ADK. A Quantitative Assessment of Changing Trends in Internet Usage for Cancer Information. *World Journal of Surgery*. 2010 Oct 23;35(2):253–7.
- [11] Fogel J, Albert SM, Schnabel F, Ditkoff BA, Neugut AI. Use of the Internet by Women with Breast Cancer. *Journal of Medical Internet Research*. 2002 Nov 22;4(2):e9.
- [12] Satterlund MJ, McCaul KD, Sandgren AK. Information Gathering over Time by Breast Cancer Patients. *Journal of Medical Internet Research*. 2003 Aug 27;5(3):e15.
- [13] Uprety D, Adhikari J, Sharma P, Arjyal L. Youtube as a Source of Information on Cervical Cancer. *North American Journal of Medical Sciences*. 2016;8(4):183.
- [14] Singh AG, Singh S, Singh PP. YouTube for Information on Rheumatoid Arthritis—a Wakeup Call? *The Journal of rheumatology*. 2012;39(5):899–903.
- [15] Kovalski LNS, Cardoso FB, D’Avila OP, Corrêa APB, Martins MAT, Martins MD, et al. Is the YouTube™ an Useful Source of Information on Oral Leukoplakia? *Oral Diseases*. 2019 Oct 9;25(8):1897–905.
- [16] Li M, Yan S, Yang D, Li B, Cui W. YouTube™ as a Source of Information on Food Poisoning. *BMC Public Health*. 2019 Jul 16;19(1).
- [17] Loeb S, Sengupta S, Butaney M, Macaluso JN, Czarniecki SW, Robbins R, et al. Dissemination of Misinformative and Biased Information about Prostate Cancer on YouTube. *European Urology*. 2019 Apr;75(4):564–7.
- [18] Google. Google Trends [Internet]. Google Trends. 2020 [cited 2020 Aug 5]. Available from: <https://trends.google.com/trends/explore?date=today%205-y&gprop=youtube&q=%2Fm%2F0j8hd>
- [19] Internet World Stats. Middle East Internet Statistics, Population, Facebook and Telecommunications Reports [Internet]. *Internetworldstats.com*. 2019. Available from: <https://www.internetworldstats.com/stats5.htm>
- [20] Mueller SM, Jungo P, Cajacob L, Schwegler S, Itin P, Brandt O. The Absence of Evidence is Evidence of Non-Sense: Cross-Sectional Study on the Quality of Psoriasis-Related Videos on YouTube and Their Reception by Health Seekers. *Journal of Medical Internet Research*. 2019 Jan 16;21(1).

- [21] Oremule B, Patel A, Orekoya O, Advani R, Bondin D. Quality and Reliability of YouTube Videos as a Source of Patient Information on Rhinoplasty. *JAMA Otolaryngology–Head & Neck Surgery*. 2019 Mar 1;145(3):282.
- [22] Basch CH, Hillyer GC, Garcia P, Basch CE. Content of Widely Viewed YouTube Videos about Celiac Disease. *Public Health*. 2019 Feb;167:147–51.
- [23] Ferhatoglu MF, Kartal A, Ekici U, Gurkan A. Evaluation of the Reliability, Utility, and Quality of the Information in Sleeve Gastrectomy Videos Shared on Open Access Video Sharing Platform YouTube. *Obesity Surgery*. 2019 Feb 1;29(5):1477–84.
- [24] Basch CH, Menafro A, Mongiovi J, Hillyer GC, Basch CE. A Content Analysis of YouTube™ Videos Related to Prostate Cancer. *American Journal of Men's Health*. 2016 Sep 30;11(1):154–7.
- [25] Desai T, Shariff A, Dhingra V, Minhas D, Eure M, Kats M. Is Content Really King? An Objective Analysis of the Public's Response to Medical Videos on YouTube. Ben-Jacob E, editor. *PLoS ONE*. 2013 Dec 18;8(12):e82469.
- [26] American Cancer Society. Breast Cancer [Internet]. Cancer.org. American Cancer Society; 2018. Available from: <https://www.cancer.org/cancer/breast-cancer.html>
- [27] Bernard A, Langille M, Hughes S, Rose C, Leddin D, Veldhuyzen van Zanten S. A Systematic Review of Patient Inflammatory Bowel Disease Information Resources on the World Wide Web. *The American Journal of Gastroenterology*. 2007 Sep;102(9):2070–7.
- [28] Charnock D, Shepperd S, Needham G, Gann R. DISCERN: An Instrument For Judging the Quality of Written Consumer Health Information on Treatment Choices. *Journal of Epidemiology & Community Health*. 1999 Feb 1;53(2):105–11.
- [29] CDC. Breast Cancer [Internet]. 2019. Available from: <https://www.cdc.gov/cancer/breast/index.htm>
- [30] Boshers J. Complete List of Arabic Speaking Countries – 2020 Update [Internet]. Istizada. 2020. Available from: <http://istizada.com/complete-list-of-arabic-speaking-countries-2014/>
- [31] Saudi Cancer Registry M of health. Cancer incidence report Saudi Arabia. Riyadh; 2014 [cited 2017 Mar 3]. Available from: [http://www.chs.gov.sa/Ar/mediacenter/NewsLetter/2010 Report \(1\).pdf](http://www.chs.gov.sa/Ar/mediacenter/NewsLetter/2010%20Report%20(1).pdf)
- [32] Saggi S, Rehman H, Abbas Z, Ansari A. Recent Incidence and Descriptive Epidemiological Survey of Breast Cancer in Saudi Arabia. *Saudi Medical Journal*. 2015 Oct 1;36(10):1176–80.
- [33] Bevers TB, Helvie M, Bonaccio E, Calhoun KE, Daly MB, Farrar WB, et al. Breast Cancer Screening and Diagnosis, Version 3.2018, NCCN Clinical Practice Guidelines in Oncology. *Journal of the National Comprehensive Cancer Network*. 2018 Nov;16(11):1362–89.

- [34] Fox S. Food safety, Drug safety, and Pregnancy Information Are among Eight New Topics Included in Our survey. [Internet]. Pew Research Center: Internet, Science & Tech. 2011 [cited 2020 Aug 5]. Available from: <https://www.pewinternet.org/2011/>
- [35] Yurdaisik I. Analysis of the Most Viewed First 50 Videos on YouTube about Breast Cancer. *BioMed Research International*. 2020 May 27;2020:1–7.
- [36] Gokcen HB, Gumussuyu G. A Quality Analysis of Disc Herniation Videos on YouTube. *World Neurosurgery*. 2019 Apr;124:e799–804.
- [37] Esen E, Aslan M, Sonbahar BÇ, Kerimoğlu RS. YouTube English Videos as a Source of Information on Breast Self-examination. *Breast Cancer Research and Treatment*. 2018 Nov 15;173(3):629–35.
- [38] Mueller SM, Hongler VNS, Jungo P, Cajacob L, Schwegler S, Steveling EH, et al. Fiction, Falsehoods, and Few Facts: Cross-Sectional Study on the Content-Related Quality of Atopic Eczema-Related Videos on YouTube. *Journal of Medical Internet Research*. 2020 Apr 24;22(4):e15599.
- [39] Tolu S, Yurdakul OV, Basaran B, Rezvani A. English-language Videos on YouTube as a Source of Information on self-administer Subcutaneous anti-tumour Necrosis Factor Agent Injections. *Rheumatology International*. 2018 May 14;38(7):1285–92.
- [40] Sahin AN, Sahin AS, Schwenter F, Sebahang H. YouTube Videos as a Source of Information on Colorectal Cancer: What Do Our Patients Learn? *Journal of Cancer Education*. 2018 Sep 21;34(6):1160–6.
- [41] ESMO. BRCA Mutation Carriers and Other Breast/Ovarian Hereditary Cancer Syndromes | ESMO [Internet]. www.esmo.org. 2016 [cited 2020 Aug 5]. Available from: <https://www.esmo.org/guidelines/hereditary-syndromes/brca-mutation-carriers-and-other-breast-ovarian-hereditary-cancer-syndromes>

Figures



- 1 Algeria

- 2 Syria

- 3 Sudan

- 4 Libya

- 5 Egypt

Figure 1

Breast Cancer Topic on YouTube™: Distribution of Interest by Region [Map taken from: Google Trends (<https://trends.google.com/trends/explore?date=today%205-y&gprop=youtube&q=%2Fm%2F0j8hd>)].
Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

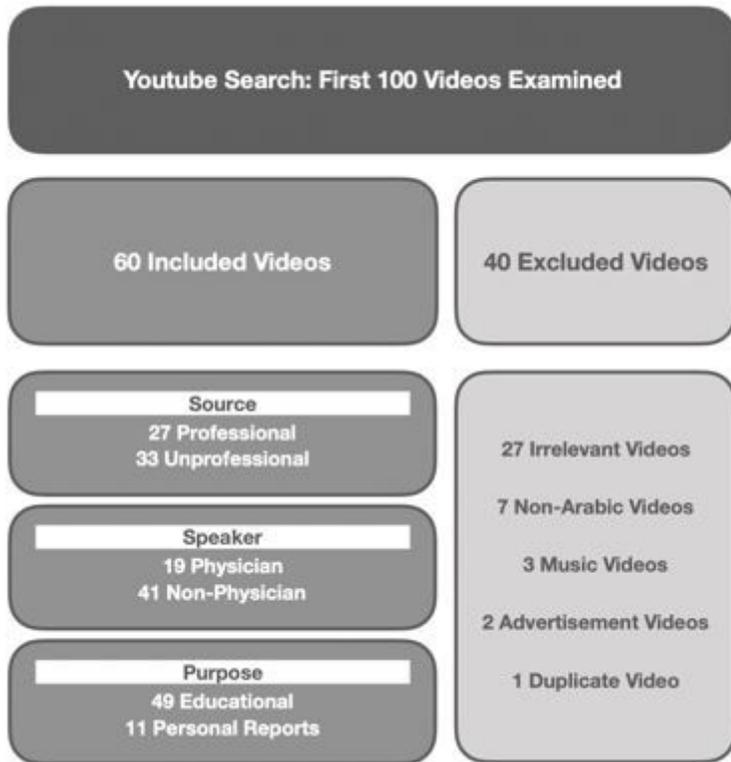


Figure 2

Flow diagram of the selection process

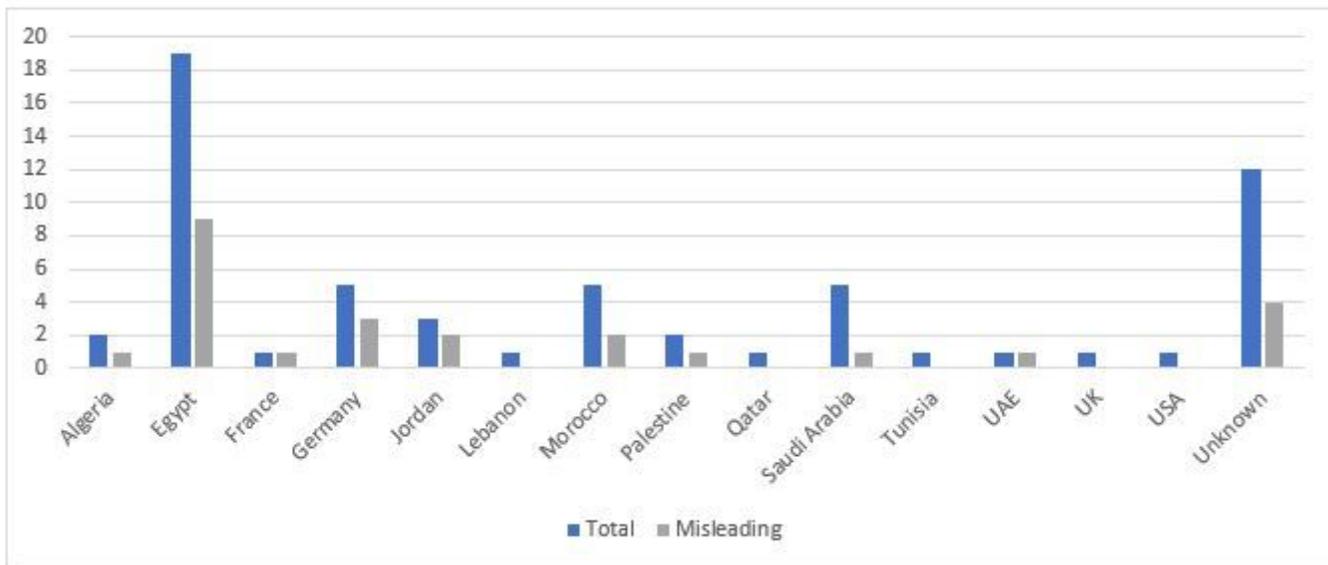


Figure 3

Distribution of Videos by Country source

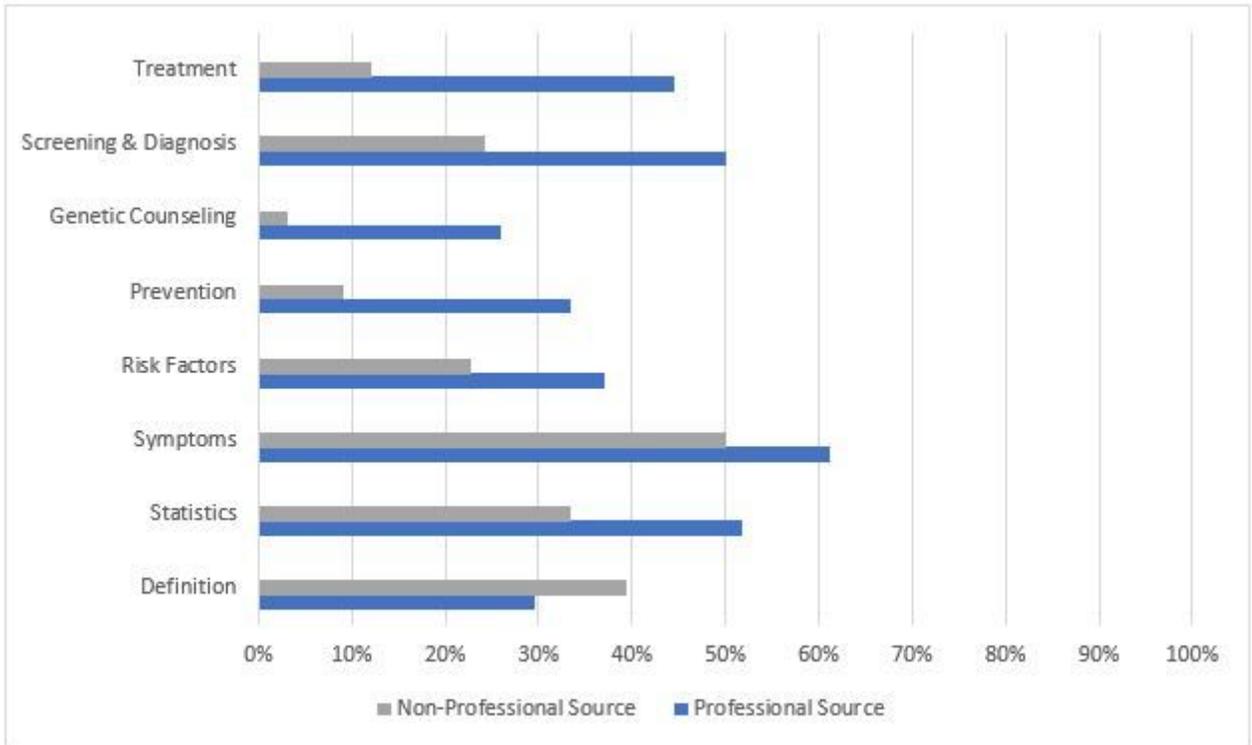


Figure 4

Distribution of Breast Cancer Information in YouTube Videos