

Is YouTube a Reliable Source of Information on Antimicrobial Resistance in the Arab World?

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Keywords

Antimicrobial resistance · YouTube · Arabic · Public health · Public education

Abstract

Introduction: Antimicrobial resistance (AMR) is a global challenge that the public should be aware of. YouTube is a major educational source on the internet from which the public could learn about AMR. We aimed to evaluate the quality and reliability of AMR videos on YouTube catered to Arabic speakers. **Methods:** This was a cross-sectional study, where the Arabic term of AMR was used to search for AMR videos on YouTube published in Arabic. Videos that were non-Arabic, targeted children, and did not target the public, and TV reports/interviews were excluded. Views and interactions with the videos were evaluated. The quality and reliability were assessed using global quality scale (GQS) and DISCERN tool, respectively. **Results:** Of 366 videos in search results, 96 met the eligibility criteria. Most videos came from Egypt ($n = 27$; 28.9%), followed by Saudi Arabia ($n = 22$; 22.9%). Although videos from official sources have stayed longer on YouTube (1,348 vs. 844 days; $p = 0.025$), videos from unofficial sources had a significantly higher score of viewers' interaction based on views and likes counts (2 vs. 5; $p < 0.0001$). Nevertheless, no significant difference was

observed between the two video groups in GQS score (3 vs. 3; $p = 0.307$) and DISCERN score (3 vs. 3; $p = 0.412$). **Conclusion:** Arabic AMR videos on YouTube from official and unofficial sources had an overall good quality and reliability. Healthcare providers can refer their patients to videos that meet such criteria regardless of their source. Additionally, authorities and public health organizations can use these videos in awareness campaigns on antibiotics and AMR.

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Introduction

Antimicrobial resistance (AMR) is a major challenge worldwide, in which microorganisms, particularly bacteria and fungi, evolve over time and cease to respond to antimicrobials, making infections more difficult to treat and raising the risk of morbidity and mortality [1]. In the Arab World, the current status of AMR shows high resistance rates to β -lactams, macrolides, fluoroquinolones, and antituberculosis medications when compared to other regions in the world [2]. Antibiotic misuse is one of the key contributors to the rise in AMR. This includes self-medication due to lack of prescription obligation, incorrect dosage, missed doses, and reuse of antibiotics

from past prescriptions [3, 4]. Studies from some Arabic countries showed high rates of inappropriate use of antibiotics as demonstrated by the high rates of antibiotics self-medication, which ranged from 44 to 77.5% [5–9]. The Gulf Cooperation Council countries, which includes Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Oman, and Bahrain, have a high rate of Gram-negative bacterial resistance, such as extended-spectrum beta-lactamases, carbapenem-resistant Enterobacterales, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii* [10–12].

The internet is a powerful education tool and is a source that affects a layperson's knowledge about nearly any topic, including AMR. YouTube is a video-sharing website that may aid in bridging the education gap. Its fame has expanded tremendously in recent years because of its relatively accessible, user-friendly, and consumer-run nature. It currently has a global audience of approximately 2 billion people and is increasingly being used to address health-related issues. In a 2022 report about social media usage worldwide, several Arabic countries were among the top world countries in the number of users on some popular social media platforms, including YouTube [13]. Therefore, YouTube has a great potential to be an awareness tool about antibiotic misuse [14].

Knowledge of Arabs on AMR and appropriate handling of antibiotics was assessed in several studies from different Arabic countries, where a large proportion of the participants had insufficient knowledge, which was demonstrated by their agreements with statements such as antibiotics can be used for viral infections like cold and flu, that they can be stopped once the patient feels better, and that they can be shared or kept for future use [6, 7, 15, 16]. Moreover, some participants in these studies reported using social media and/or the internet as their main source of information [6, 7, 15, 16]. To further evaluate the content, quality, and reliability of Arabic YouTube videos addressing AMR from which the Arabs could learn about this crucial topic, this study was conducted. Results from this study should inform healthcare providers and policymakers about the quality of information presented to the public in the Arab World, which may help guide future antimicrobial awareness campaigns.

Methods

Study Design and Search Strategy

In this cross-sectional study, the keyword “Antimicrobial Resistance” in Arabic (مقاومة المضادات الحيوية) was searched between July 2 and October 2, 2022, where all published videos from in-

ception until this search period were evaluated. The videos were sorted according to the number of views in a descending order. Videos in languages other than Arabic, TV reports, interviews, irrelevant topics, videos targeting children, videos not targeting the public, and videos that lack information on AMR were excluded. This study was exempted from ethical review by the Research Ethics Committee of the Faculty of Pharmacy, King Abdulaziz University as the study did not involve human data.

Video Parameters

Collected data on videos included the source (official or unofficial), type of image (real or animation), the profession of the speaker if he/she appears on the video (healthcare worker or other), days since upload (from the date of upload to the day of visit), country of video creator/publisher, video length, total views, views per day (total views divided by the number of days since the video was uploaded), number of likes, number of dislikes, number of comments, video power index (VPI), and the viewers' interaction. VPI was calculated as follows:

$$\left(\frac{\text{number of likes} \times 100}{[\text{number of likes} + \text{number of dislikes}]} \right) \times \frac{(\text{views per day})}{100}$$

where the views per day were calculated by dividing the number of views by the number of days since the video was uploaded. Viewers' interaction was calculated using the following equation:

$$\left[\frac{(\text{number of likes} - \text{number of dislikes})}{\text{number of views}} \right] \times 100$$

Assessment of Content Quality and Reliability

Global quality scale (GQS) and DISCERN tool were used to assess the videos' quality and reliability, respectively. The GQS is a five-point scale that assesses the overall quality of the content and the usefulness of the information, where A score of 1 point indicates a poor quality and a score of 5 points indicates an excellent quality [17]. Table 1 lists the GQS criteria. The reliability of the videos was evaluated using the modified DISCERN tool, which is a five-question instrument used for judging the quality of written consumer health information on treatment choices. Each “Yes” is recorded as 1 point, and each “No” is recorded as 0 (Table 1) [18].

Statistical Analysis

Videos were categorized based on the source as either official or unofficial. Shapiro-Wilk test of normality was conducted for all the continuous data, which showed lack of normal distribution. Therefore, continuous data were presented as median (interquartile range) and compared using Mann-Whitney U test. On the other hand, categorical data were presented as numbers (percentages) and compared using χ^2 test. A *p* value of <0.05 indicated a significant difference. SPSS version 24.0 (IBM Corp., Armonk, NY, USA) was used for statistical analysis.

Results

Of 355 videos shown in search results and screened for eligibility, 96 met the study criteria and were evaluated. Figure 1 displays the reasons for exclusion of 246 videos,

Table 1. GQS and DISCERN tool scoring criteria

| | |
|---------|---|
| GQS | <ol style="list-style-type: none">1. Poor quality, very unlikely to be of any use to patients2. Poor quality but some information present, of very limited use to patients3. Suboptimal flow, some information covered but important topics missing, somewhat useful to patients4. Good quality and flow, most important topics covered, useful to patients5. Excellent quality and flow, highly useful to patients |
| DISCERN | <ol style="list-style-type: none">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? |

where most videos ($n = 108$) were excluded due to more than one reason. The characteristics of the included videos are listed in Table 1. Overall, most videos came from Arabic countries and were presented by a healthcare worker. Among the Arab countries, Egypt contributed the most with 27 (28.1%) videos, 25 (37.3%) of which were produced by unofficial sources. Saudi Arabia comes the second with a total of 22 (22.9%) videos. Six of the included videos (6.3%) were produced by international organizations, such as the World Health Organization (WHO) and Consumers International. Figure 2 illustrates the distribution of countries from which the videos were produced and their counts.

While the oldest video was published in 2014, most videos were published in year 2021 ($n = 21$) as shown in Figure 3, where official sources have produced videos on AMR long before unofficial producers published their videos as could be seen from the median time since video upload (1,348 vs. 844 days; $p = 0.025$). Despite that videos from unofficial sources were significantly longer with a median of 4.75 min compared with 2.36 min for videos from official authorities ($p < 0.0001$), total views and the average views per day were not different between the two video categories. Moreover, videos from unofficial sources outscored the official source videos in the median number of likes and comments (25 vs. 6 and 5 vs. 0; $p = 0.021$ and < 0.0001 , respectively); hence, they had better viewers' interaction score of 5 versus 2 for the official videos ($p < 0.0001$) with no difference in VPI score. In terms of the quality and reliability of information presented in the videos, GQS and DISCERN scores were comparable between the two groups with a median of 3 points for both video groups and for both scoring scales, which indicate balanced and neutral content in terms of reliability, as well as suboptimal flow with some information was covered and some were missing in terms of quality (Table 2).

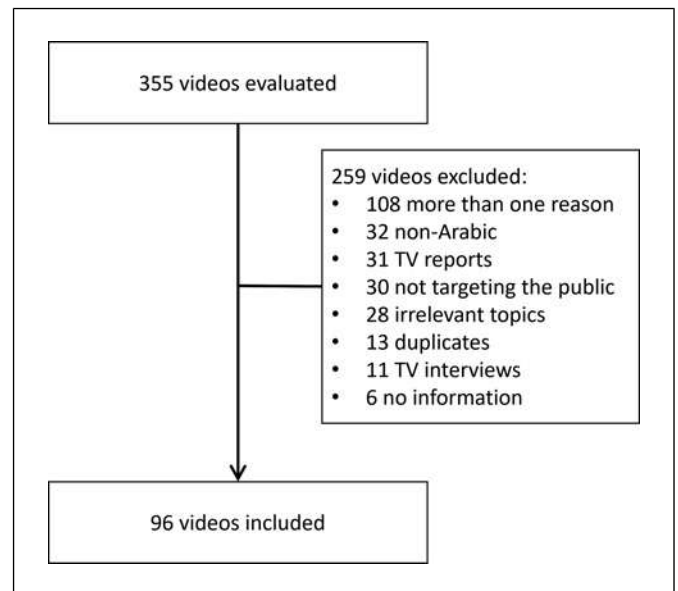


Fig. 1. Determination of videos' eligibility.

Discussion

AMR is a worldwide predicament that requires collaborative efforts to tackle it, and public education and awareness is one way to help mitigate it [19]. In this study, we assessed the quality of educational Arabic AMR videos on YouTube that contributes to the knowledge of the public in the Arab World about this issue, where 96 videos were evaluated. Overall, the videos were of good scientific quality and reliability whether they were published by official or unofficial producers on YouTube as the quality and reliability scores were comparable despite that most unofficial video creators did not disclose the sources of their information. However, those that disclosed their references mostly relied on official sources,

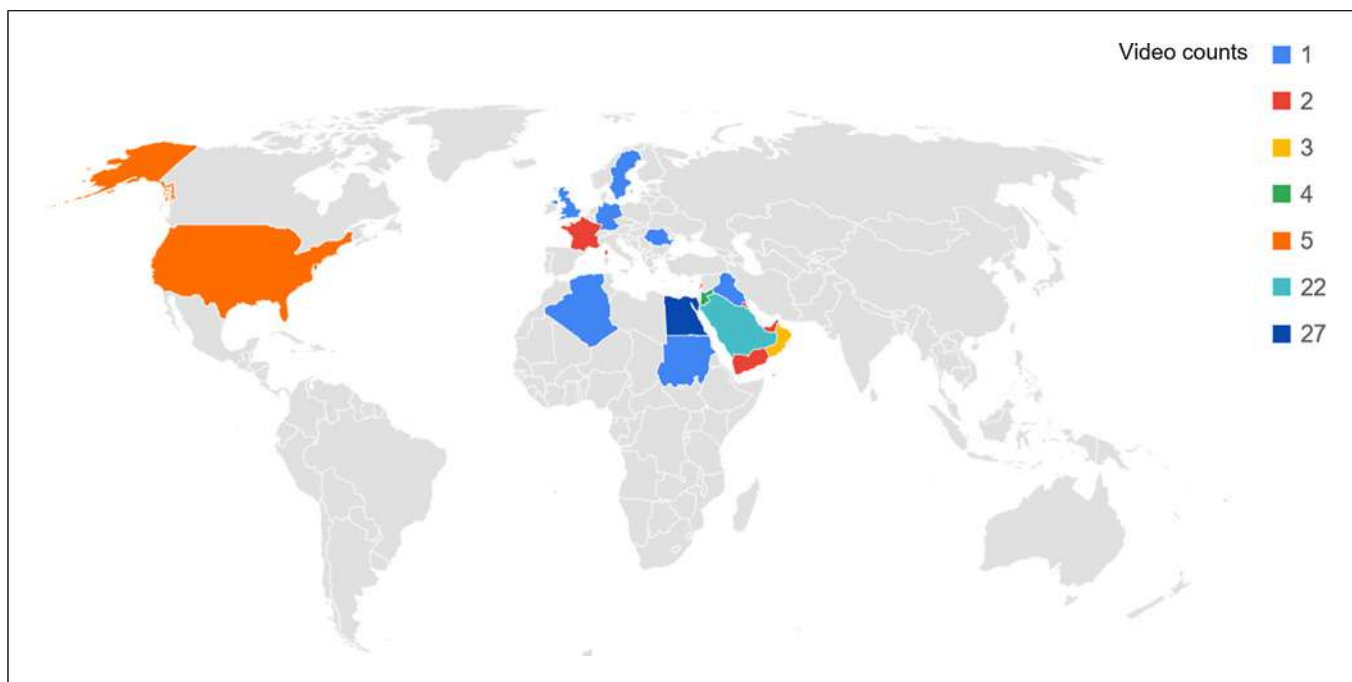


Fig. 2. Distribution of source country of the included videos. Note: There were 7 videos that were published by international organizations and 3 videos of unknown origin (not shown on the map).

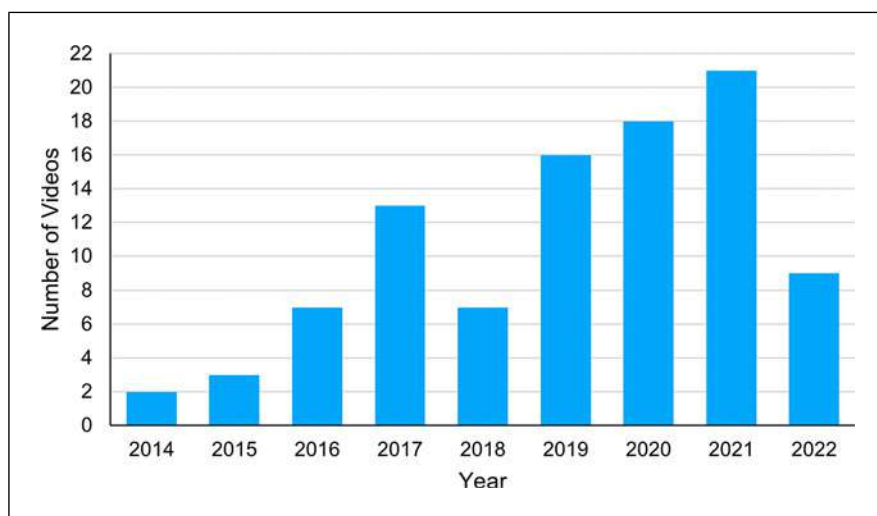


Fig. 3. Counts of videos published per year.

such as the WHO website and local ministries of health. Although videos uploaded by official sources were older and shorter than unofficial videos, the latter were more popular as they received higher level of interactions in terms of views, likes, and comments. This may be due to the blogger's interaction as most of these videos ($n = 40$; 59.7%) were in real image, which may motivate viewers to

interact with them, as well as the fact that official sources may not typically interact with the viewers in the comments section; hence, viewers may abstain from commenting.

Among the source countries of the included videos, Egypt topped the list with 28.1% ($n = 27$) of the videos, followed by Saudi Arabia in the second place with

Table 2. Characteristics of the included videos

| Characteristic | Total (n = 96) | Official source (n = 29) | Unofficial source (n = 67) | p value |
|--------------------------------------|--------------------|--------------------------|----------------------------|---------|
| Country ^a | | | | 0.003 |
| Egypt | 27 (28.1) | 2 (6.9) | 25 (37.3) | |
| Saudi Arabia | 22 (22.9) | 5 (17.2) | 17 (25.4) | |
| International organization | 6 (6.3) | 5 (17.2) | 1 (1.5) | |
| USA | 5 (5.2) | 2 (6.9) | 3 (4.5) | |
| Jordan | 4 (4.2) | 3 (10.3) | 1 (1.5) | |
| Morocco | 4 (4.2) | 0 (0.0) | 4 (6.0) | |
| Oman | 4 (4.2) | 3 (10.3) | 1 (1.5) | |
| Palestine | 4 (4.2) | 1 (3.4) | 3 (4.5) | |
| France | 2 (2.1) | 1 (3.4) | 1 (1.5) | |
| Kuwait | 2 (2.1) | 2 (6.9) | 0 (0.0) | |
| Lebanon | 2 (2.1) | 2 (6.9) | 0 (0.0) | |
| United Arab Emirates | 2 (2.1) | 1 (3.4) | 1 (1.5) | |
| Yemen | 2 (2.1) | 1 (3.4) | 1 (1.5) | |
| Romania | 1 (1.0) | 0 (0.0) | 1 (1.5) | |
| United Kingdom | 1 (1.0) | 0 (0.0) | 1 (1.5) | |
| Sweden | 1 (1.0) | 0 (0.0) | 1 (1.5) | |
| Iraq | 1 (1.0) | 0 (0.0) | 1 (1.5) | |
| Germany | 1 (1.0) | 0 (0.0) | 1 (1.5) | |
| Sudan | 1 (1.0) | 1 (3.4) | 0 (0.0) | |
| Algeria | 1 (1.0) | 0 (0.0) | 1 (1.5) | |
| Unknown | 3 (3.1) | 0 (0.0) | 3 (4.5) | |
| Arab country | 75 (87.2) | 20 (87.0) | 55 (87.3) | 0.966 |
| Speaker was a HCW ^b | 60 (72.3) | 20 (87.0) | 40 (66.7) | 0.065 |
| Time since upload, days ^c | 921 [432–1,698.25] | 1,348 [643.5–2,026] | 844 [390–1,604] | 0.025 |
| Video length, s | 219.5 [140.5–420] | 142 [67–291] | 285 [174–475] | 0.001 |
| Video length, min | 3.64 [2.34–7.37] | 2.36 [1.12–4.85] | 4.75 [2.98–8.53] | <0.0001 |
| Type of image | | | | 0.050 |
| Real | 51 (53.1) | 11 (37.9) | 40 (59.7) | |
| Animation | 45 (46.9) | 18 (62.1) | 27 (40.3) | |
| Total views | 517 [72–2,755] | 538 [26.5–3,200] | 496 [86–2,728] | 0.495 |
| Views per day | 0.56 [0.13–2.6] | 0.27 [0.08–2.38] | 0.62 [0.15–2.61] | 0.150 |
| Number of likes | 16.5 [4–106] | 6 [1–71.5] | 25 [5–116] | 0.021 |
| Number of dislikes | 0 [0–2] | 0 [0–2] | 0 [0–2] | 0.821 |
| Number of comments | 3 [0–13.75] | 0 [0–3.5] | 5 [0–23] | <0.0001 |
| VPI | 1 [0–3] | 0 [0–2.5] | 1 [0–3] | 0.136 |
| Viewers' interaction | 4.5 [2–8] | 2 [1–3.5] | 5 [3–9] | <0.0001 |
| GQS score | 3 [3–4] | 3 [2–4] | 3 [3–4] | 0.307 |
| DISCERN score | 3 [2–3] | 3 [2–3] | 3 [2–3] | 0.412 |

Data are presented as median [IQR] or *n* (%). HCW, healthcare worker; GQS, global quality scale; VPI, video power index; IQR, interquartile range. ^aVideos from non-Arab countries were either of Arabic immigrants or were non-Arabic videos dubbed or translated to Arabic. ^bThis is only for the videos where the speaker appears on the screen (total *n* = 83). ^cCalculated from the day of video visit.

22.9% ($n = 22$) of the videos. This could be potentially because Egypt is the country with the highest population in the Arab World, where 71.9% of Egyptians (approximately 76.3 million people) use the internet compared with Saudi Arabia which has about 35 million internet users (97.9% of the country's population) based on a recent global report published in 2022 [13, 20]. While it was expected that the majority of the videos would come from Arabic countries, six videos (6.3%) came from international organizations, such as the WHO, but were published in Arabic. The videos that were labeled as coming from non-Arab countries were originally published in non-Arabic language but were translated or dubbed to Arabic.

Previous studies from the Arab World have shown that the public often use social media (or the internet) as one of their sources of information about AMR and appropriate use of antibiotics [15]. In a recent study from Saudi Arabia, 28% of the participants ($n = 111$ of 397) reported such behavior, whereas about 9% ($n = 17$ of 193) of the participants in another recent study from Iraq reported it [7, 16]. The larger percentage in the former study could be potentially justified by the fact that many of the included videos in this study were produced from Saudi Arabia ($n = 22$; 22.9%).

Studies that surveyed the Arabic public within the last decade showed a trend toward poor understanding of AMR and appropriate antibiotics use according to a systematic review of nine studies by Almohammed et al. [15]. However, it was noted that most of these studies were conducted between 2012 and 2016 before most of Arabic educational videos on AMR were published ($n = 12$ vs. $n = 84$ published in 2017 and onward). Conversely, two new studies from Saudi Arabia demonstrated a shift in the level of knowledge about AMR and antibiotics use. One study by Alqarni et al. [21] found younger age (31–40 years) having undergraduate or postgraduate education and being employed were significantly associated with better awareness and knowledge of AMR. The other study by Alduahimi et al. [16] found similar results with factors such as the female gender and a health science background.

This is the first study to evaluate the Arabic content in YouTube pertaining to educating the public on AMR and risks associated with misuse of antimicrobials. However, some limitations cannot be overlooked. The values on which viewers' interaction score is based (number of views, likes, dislikes and number of comments) are continuously changing; hence, the numbers presented reflect only the values reported on the video

visit day. Additionally, these results reported in this study may not represent all the population in the Arab countries as some users may search for the same content but in languages other than Arabic, such as French which is the second language in some Arabic North African countries (i.e., Tunisia, Algeria, and Morocco) [22].

Conclusion

Findings from this study indicate that Arabic AMR videos on YouTube from unofficial sources had a comparable good quality and reliability with videos from official sources. Therefore, healthcare providers in Arab countries can be assured of the credibility of these videos and the knowledge delivered to their patients and the public about AMR; hence, they can refer their patients to them. Moreover, authorities and public health organizations can make use of such videos in awareness campaigns related to antibiotics and AMR.

Statement of Ethics

An ethics statement was not required for this study type; no human or animal subjects or materials were used.

Conflict of Interest Statement

The authors declare no conflict of interest.

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Author Contributions

A.K.T. designed the study, performed statistical analysis and interpretation, and reviewed and edited the manuscript. R.Y.B., S.S.A., A.E.A., and M.H.Q. collected the data. A.K.T., R.Y.B., S.S.A., A.E.A., and M.H.Q. drafted the manuscript. All authors approved the final manuscript.

Data Availability Statement

The dataset is available on Open Science Framework at https://osf.io/3y5b8/?view_only=c5f7b69b8f4d4f32a2f72be93c52b0d7. Further inquiries can be directed to the corresponding author.

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