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REVIEW ARTICLE

YouTube for Information on Rifampicin in Tuberculosis Management: An Analysis of Reliability and Usefulness

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ABSTRACT

Tuberculosis (TB) is one of the leading infectious diseases worldwide caused by Mycobacterium tuberculosis. Rifampicin is primarily used as a first-line treatment for TB. There were numerous videos pertaining to the use of rifampicin in the management of TB in YouTube, which were used by students in healthcare studies as their references. The aim of this study is to evaluate the quality and usefulness of the information in YouTube regarding rifampicin in TB management. A systematic search for videos on the YouTube website was conducted using the keywords "Rifampicin" and "Pharmacology of rifampicin". The videos meeting eligibility criteria were assessed. The videos were assessed using a five-question DISCERN scale and Global Quality Score (GQS). Other video characteristics like source/ownership of the videos, duration, views, likes, number of days posted, likeability and comments were also obtained. A total of six videos were selected. Most videos categorised under education as these videos were uploaded by university (n=4; 66.7%). The interquartile range of the GQS was 3 [2.25-3.75], and DISCERN score was 3 [2.25-3.75]. The score from both scales identified that YouTube is a reliable source of references for students to gain deeper understanding about the use of rifampicin in TB management.

Contribution/Originality: This study contributes to the existing literature by critically evaluating YouTube as an informal learning source for rifampicin in

tuberculosis management. It is among the few studies assessing drug-specific educational videos. The paper's primary contribution is documenting substantial content deficits, guiding educators toward improving digital resources used by students and self-directed learners.

1. Introduction

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* and primarily affects the lungs, with pulmonary disease (Kaufmann & Schaible, 2005). In the year 2022, World Health Organization (WHO), stated that 1.3 million people died from tuberculosis following coronavirus disease (COVID-19) (World Health Organization, 2023). Moreover, individuals with HIV are more susceptible to contracting tuberculosis due to the immunosuppressive effects of HIV. This increased incidence of tuberculosis significantly contributes to the elevated rate of mortality among people with TB (Komrower & Thillai, 2015). In 2022, approximately 10.6 million people worldwide were infected with tuberculosis (TB), which includes 5.8 million men, 3.5 million women, and 1.3 million children (World Health Organization, 2023). Despite every age group being at risk of being infected with TB, adults in their peak productive years (65 years and above) had more risk to be infected (World Health Organization, 2023).

Furthermore, in terms of geographical area, low and middle-income countries account for more than 80% of all cases and deaths from TB (World Health Organization, 2023). In 2022, the WHO's South-East Asian Region reported tuberculosis cases (46%), which is followed by the African Region (23%), and the Western Pacific (18%) (World Health Organization, 2023). About 87% of new TB cases occurred in the 30 countries with a high TB burden, with Bangladesh, China, the Democratic Republic of the Congo, Indonesia, India, Nigeria, Pakistan, and the Philippines accounting for more than two-thirds of the global total (World Health Organization, 2023). Malaysia is classified as an intermediate country in terms of tuberculosis (TB) incidence. In 2021, the estimated total TB incidence in Malaysia was 97 cases per 100,000 population, with a range of 79 to 106 (World Health Organization, 2023).

Each healthcare provider needs to consider the patient's clinical picture and the available local management alternatives. In Malaysia, guidelines provided by the Ministry of Health (KKM) are usually used by healthcare professionals seeking information and medications (Ministry of Health Malaysia, 2021). These guidelines are updated on a regular basis to consider new evidence and best practices in the field to give healthcare professionals access to the most up-to-date and effective treatment suggestions. For people with latent stage of infection, a person should receive preventative therapy if they are infected with TB infection but do not yet have the active TB disease (Alsayed & Gunosewoyo, 2023). The duration of inactive tuberculosis treatment can range from three to nine months depending on the treatment regimen. Treatment regimens for inactive tuberculosis involve various combinations of medications, such as isoniazid, rifampicin, and rifapentine (Francesca et al., 2020). An individual with active tuberculosis will likely get six to twelve months of treatment consisting of a combination of antimicrobial drugs. Isoniazid INH along with pyrazinamide, ethambutol, and rifampicin is the most often prescribed treatment for active tuberculosis (Myungsun et al., 2024). Rifampicin, a highly important medicine in the treatment of TB, was discovered in 1965. This is mostly due to its sterilising qualities and its ability to accelerate the treatment process (Grobbelaar et al., 2019).

Therefore, more information of rifampicin was available on the Internet which has made it easier and faster for the students as well as public to search and learn about rifampicin. YouTube is a limitless resource providing access. Being able to access medical or health educational resources has become more convenient for students, owing to the growing number of medical professionals and academicians producing educational videos on YouTube. Pharmacy students can get advantages by acquiring additional knowledge on pharmaceuticals to improve their comprehension, specifically in the utilisation of rifampicin in TB management. In addition to traditional educational resources such as lectures, guidelines, textbooks, and published studies, research has recognised YouTube as a valuable educational tool. YouTube facilitates connections among academics, educators, and researchers worldwide, offering engaging and informative content that enhances education by fostering innovation and creativity (Sharma & Sharma, 2021).

With over 2 billion daily viewers, YouTube is the most popular video-sharing website globally, since its creation in 2005 (Davidson et al., 2010). There are currently more than 1 billion hours of video on YouTube. Whilst YouTube has become a promising platform for searching and sharing health information in academic settings, there is a lack of quality control and peer review for many videos on the platform. Certain health-related data has been found to contain misleading and erroneous information, which could cause misinformation to spread and seriously impair people's health (Yang et al., 2022). However, there is lack of information on the usefulness and the reliability of the content on rifampicin in YouTube. Furthermore, it is crucial for pharmacy students to possess knowledge regarding rifampicin due to the escalating number of TB patients being treated with this medication. Moreover, this study may acknowledge potential biases introduced by the creators' backgrounds, whether academic, medical, or commercial. For instance, videos produced by pharmaceutical companies may emphasize the benefits of rifampicin while downplaying side effects, unlike those created by independent academic sources. Recognizing these biases is crucial for viewers to critically assess the information presented. Hence, it is essential to carefully examine the content of videos upload in YouTube to establish accurate knowledge for the students. The evaluation of usefulness of the videos seek to enhance educational materials available online by thoroughly examining the YouTube video on the pharmacology of rifampicin. The study, therefore sought to answer the following questions:

i. What are the characteristics of videos related to rifampicin in TB management in YouTube?
ii. What is the quality and usefulness of videos related to rifampicin in TB management in YouTube?

2. Research Methods

2.1. Research design

This study employed a cross-sectional descriptive content analysis design to systematically evaluate YouTube videos related to rifampicin in tuberculosis management. Content analysis was chosen because it enables objective, replicable examination of publicly available digital media. The study assessed video characteristics, reliability, and usefulness at a single point in time using predefined evaluation criteria (e.g., DISCERN, usefulness score). This design is widely used for analysing health information quality on online platforms.

2.2. Search strategy

The keyword “rifampicin” and “tubercolusis” was used to search YouTube (http://www.youtube.com) on March 19, 2024. The videos must be related to the research project which is rifampicin as TB treatment as rifampicin also has been used in other treatments such as meningitis (Howard et al., 2015). A selected playlist featuring the top 50 YouTube™ videos discussing the pharmacology of rifampicin in the treatment of TB was created. The URLs of the videos were extracted and recorded in MS Excel for a thorough evaluation.

2.3. Inclusion and exclusion criteria

Videos in the English and related to rifampicin in TB were considered for inclusion. Exclusion criteria included videos that were duplicate, irrelevant or had no accompanying audio. Some of the videos are difficult to understand due to the accent barrier by the Indian instructor. Next, the video with too short videos (less than 3 minutes) and the videos that published for the commercial purposes were rejected. Table 1 listed the inclusion and exclusion criteria for video analysis.

Table 1: The inclusion and exclusion criteria for video analysis

Inclusion	Exclusion
English videos	Non-English videos
Understandable English accent	Unclear accent in English
More than 3000 viewers	Less than 3000 viewers
Tuberculosis related content	Irrelevant content of rifampicin with tuberculosis
Education content	Advertisement
More than 3 minutes video	Video content less than 3 minutes

2.4. Data extraction

The following data was extracted from each video by final year students, Diploma in Pharmacy (Nurul Hani Mohd Sofi, Alieya Ayuni Azmi and Nurain Balqis Sazwani Khairul Anur) and entered into a Microsoft Excel. For instance, the presenter, source of the video, number of “thumbs up”, number of views, length of the video, number of comments, and duration since uploaded. We further captured engagements such as views, likes, and comments, along with the time elapsed since each video was first published. The viewer's opinions can be derived from the comments and likes on the videos. The classification of presenters was determined as healthcare professional (HCPs), personal experience and educational purpose. Medical professional from healthcare facilities was labelled as "HCPs" when they spoke in a patient-focused instructional video. The patient-produced video is categorised as "personal experience" since the patient discusses their post-treatment feedback. In addition, videos categorised as "educational" were produced by academicians or students.

2.5. Video Evaluation

To describe the information extracted from the videos, descriptive statistics and percentage were applied. We determined the overall duration (days) since the videos were released to YouTube by subtracting the date of video publication from the date of video data extraction. Furthermore, the popularity metrics like the "average number of

views monthly" was determined by dividing the total number of views by the total number of days since uploading, multiplying the result by 30 (per month). In determining the number of likes, we multiplied by 1000 (per 1000 views) after dividing the total number of likes since the video's upload by the total number of views since uploading. The video feed abstraction processes and statistical analysis were performed using the Microsoft Excel Version.

All videos classified as useful were subsequently assessed for both reliability and completeness of information using a five-point evaluation scale. Reliability of information was rated from 1 to 5 using five criteria adapted from the DISCERN tool for assessment of written health information, as shown in Table 2 (Charnock et al., 1999). The comprehensiveness, ranging from 1 to 5, was determined by the number of key informational components presented in each video which include epidemiology or risk factors, pathogenesis, clinical presentation, additional diagnostic investigations, and treatment. Each component contributed one point, resulting in a minimum score of 1 and a maximum score of 5. (Charnock et al., 1999; Singh et al., 2012). In addition, the overall quality of the videos was analysed using the Global Quality Score (GQS) (Bernard et al., 2007; Singh et al., 2012). Videos that score five points are categorised as useful videos, while those that score one are categorised as misleading videos. Table 3 shows the five questions used in the video assessment, 5 points will be given to the video with yes and 1 point for no (Singh et al., 2012). A GQS score of 1 denotes a poor conveyance of information with extremely limited content for the audience, whilst a score of 5 signifies an outstanding video in terms of quality and highly beneficial for the public (Bernard et al., 2007). The sum of GQS was estimated to evaluate the usefulness of the video (Bernard et al., 2007; Singh et al., 2012).

The videos provided were studied and evaluated by three students pursuing a Diploma in Pharmacy, namely Nurul Hani Mohd Sofi, Alieya Ayuni Azmi, and Nurain Balqis Sazwani Khairul Anuar. If there was a difference of three or more points in the GQS or content scores given by the three researchers, an arbitrator (Nursyuhadah Othman) resolved the final scores. Furthermore, the final statistical analysis incorporated the mean scores obtained from the three separate researchers.

Table 2: Assessment of reliability of according to DISCERN scale

No	Reliability of information (1 point for Yes, 0 point for No)
1	Are the aims clear and achieved?
2	Are reliable sources of information used?
3	Is the information presented balanced and unbiased?
4	Is the information presented balanced and unbiased?
5	Are areas of uncertainty mentioned

Source: Charnock et al. (1999) and Singh et al. (2012).

Table 3: Global quality scale (GQS) criteria used to score videos with information on rifampicin in tuberculosis management on YouTube

GQS	Description
1	Poor quality, poor flow of the video, most information missing, not at all useful for patients
2	Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients

3	Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients
4	Good quality and generally good flow. Most of the relevant information is listed, but some topics not covered, useful for patients
5	Excellent quality and flow, very useful for patients

Source: Bernard et al. (2007) and Singh et al. (2012)

2.6. Statistical analysis

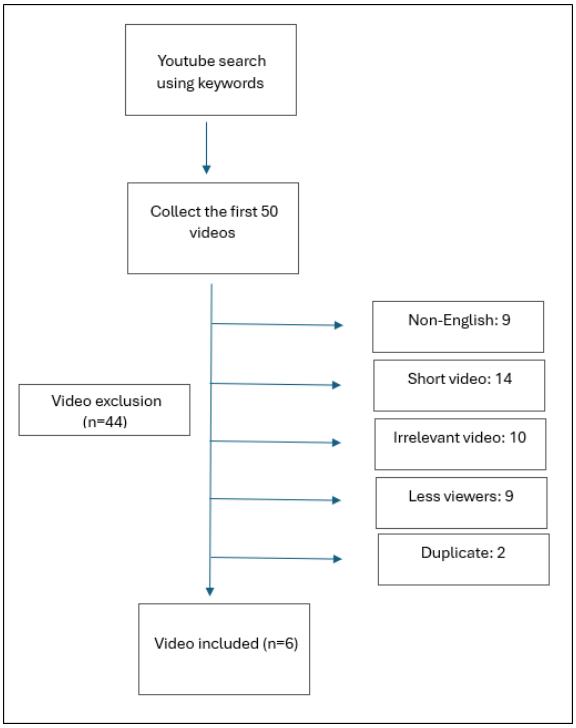
To describe the information extracted from the videos, descriptive statistics were applied. By deducting the date of video publication from the date of video data extraction, we were able to determine the total number of days since the videos were uploaded in YouTube. Furthermore, we determined popularity metrics like the "average number of views monthly" by dividing the total number of views by the total number of days since uploading, multiplying the result by 30 (per month). In determining the number of likes, we multiplied by 1000 (per 1000 views) after dividing the total number of likes since the video's upload by the total number of views since uploading (Aurlene et al., 2024). Median and interquartile range were also used to describe the values. The video feed abstraction processes and statistical analysis were performed using Microsoft Excel.

3. Results

3.1. Selection and screening of the videos

Of the 50 videos uploaded from YouTube, that were selected and reviewed, six videos met the eligibility criteria. Figure 1 shows the screening process for each video. Nine videos were eliminated from consideration due to their non-English content. Among the 44 videos, fourteen short duration videos (less than three minutes) were eliminated.

Figure 1: The selection of videos.



3.2. The characteristics of the video

A detailed overview of the videos is presented in Table 4, including the total number of views (147,049 times) and total duration (46.41 min). The median duration of the videos was 7.0 min. The interquartile range of the GQS was 3 [2.25-3.75], and DISCERN score was 3 [2.25-3.75]. Table 5 showed the category "Education" received the highest number of views per 30 days (653.84 views) and likes per 1000 views (14.03 likes), accounting for the majority (66.67%) of the total. Meanwhile, videos from the "HCP" (33.33%) category, which has the fewest views (149.35) and likes (12.54).

The videos were classified as "low" (n=2), "moderate" (n=2), and "excellent" (n=2) according to their overall scores, as indicated in Table 6. The videos of excellent quality had the longest average duration and the highest total views and likeability when compared to videos of low and moderate quality. Conversely, videos of poor quality received the most views, likes, and comments.

Table 4: Summary of the included Youtube videos about rifampicin in TB management

Variables	Values, median [interquartile range]
Length (min)	7.0 [5.75-8.08]
Likes	212.5 [113-567]
Comments	9 [4-17.75]
Views	147,049
Total duration (min)	46.41 min
Days posted	1162 [973-1562.5]
Likeability	0.14297 [0.09-0.28]]
GQS score	3 [2.25-3.75]
DISCERN score	3 [2.25-3.75]

Table 5: Table of characteristic collected from each video

Characteristics	Video 1	Video 2	Video 3	Video 4	Video 5	Video 6
Length (minutes)	8.27	5.13	5.5	13.54	6.48	7.49
Likes	806	661	285	140	104	45
Total views	65,785	32,832	26,933	11,238	6,743	3,518
Number of comments	31	19	4	4	14	0
Video category	Education	Education	Education	HCPs	Education	HCPs

Table 6: Detailed analysis of the video characteristics based on GQS

Characteristics	Low (n=2)	Moderate (n=2)	Excellent (n=2)
Length (min)	6.7	7.0	9.5
Likes	733.5	74.5	212.5
Comments	25	7	8
Views	49308.5	5130.5	19085.5
Days posted	2052	1142	1323
Likeability	0.98	0.71	1.84

4. Discussion

As to other platforms for sharing videos, YouTube permits all registered users to freely and openly upload and share videos pertaining to health. Nevertheless, to date, prior research has not fully assessed the content and quality of YouTube videos regarding rifampicin in TB management. Therefore, the objective of this study is to analyse the usefulness of educational content about rifampicin in management of TB.

Out of six videos, there are two sources of videos (educational and medical sources) that met the eligibility criteria for further analysis. From our point of view, academic and medical sources are more reliable because the content creators had an experience and better understanding about rifampicin in TB management. Moreover, most videos refer to reliable textbook and journals in both pharmacology and diseases. In contrast previous studies in video analysis identified that most videos in disease management were published by healthcare professionals (Singh et al., 2012; Yang et al., 2022). This study identifies the lack of videos from the patients' or caregivers' point of view. Their opinions regarding TB and the use of rifampicin could be invaluable for other TB patients as well as for students and healthcare professionals, as they provide insights into the real-world challenges and needs of those undergoing treatment.

The study also examined the accessibility of these videos, noting that features such as subtitles and visual aids can greatly enhance their educational value. Videos that are more accessible, especially those offering subtitles in multiple languages, are likely to reach a broader audience, including non-native speakers and individuals with hearing impairments. The absence of these features limits the potential impact of the content, particularly in regions where TB is prevalent, but English is not the primary language.

Furthermore, the videos were classified into three distinct levels of quality: low, moderate, and excellent. The videos of excellent standard had the longest average duration and achieved the most total views and likeability in comparison to videos of low and moderate quality. Videos with excellent quality may offer more scientifically precise and trustworthy data that meets the criteria of the viewers, resulting in a higher number of views and likes (Yang et al., 2022). Additionally, engagement metrics such as comments and shares were considered, providing insights into the viewers' perceptions and common misconceptions, which could be critical for guiding the development of future educational content.

In addition, each video was assessed using both GQS and DISCERN scores to evaluate their usefulness and reliability. These assessments provided a comprehensive measure of the quality and trustworthiness of the content presented in the videos. Interestingly, all the videos exhibited similar scores on both the GQS and DISCERN scales. This consistency across the scores suggests that both scales may be reliable tools for evaluating video content, offering consistent results regardless of the specific criteria each scale emphasizes. The uniformity in scoring also highlights the general quality and reliability of the videos analysed, reinforcing the validity of using these scales in future research endeavours.

Additionally, this study might be limited as the search results on YouTube are dynamic and may change over time. The algorithms that determine video rankings and suggestions are continuously updated, which means that the relevance and visibility of videos can vary. Therefore, our study only reflects the results for rifampicin at the time

it was conducted. Additionally, our study focused solely on direct searches conducted on YouTube and did not consider videos that are viewed through other platforms that embed or link to YouTube videos. This limitation means that our analysis does not capture the full spectrum of online video content related to rifampicin and TB management. The videos included in our analysis were evaluated by students who possess theoretical knowledge of rifampicin and TB management. This introduces a degree of inherent bias, as their perspective may differ from that of the public, who are the primary audience for these videos. To mitigate this bias and enhance the robustness of our findings, we consulted with other pharmacy lecturers and hospital pharmacists to validate our analysis.

In conclusion, while YouTube serves as a valuable platform for disseminating educational content on rifampicin and TB management, this study highlights the need for more diverse and accessible content. Future content creators should consider including patient testimonials, updating videos with the latest research, and ensuring that videos are accessible to a wider audience using subtitles and visual aids. Additionally, comparing the educational content on YouTube with that of other platforms could provide further insights into where users are most likely to find reliable information. Ethical considerations should also be prioritized to ensure that health-related content on YouTube is accurate, up-to-date, and easily understood by the general public. By addressing these areas, the quality and impact of online educational content on rifampicin and TB management can be significantly improved.

5. Conclusion

In summary, while our study offers valuable insights into the quality and reliability of YouTube videos on rifampicin, it is essential to acknowledge these limitations. Future research should aim to address these constraints by expanding to the other sites, conducting longitudinal analyses, and possibly integrating additional evaluation criteria to provide a more comprehensive understanding of online health information.

Ethics Approval and Consent to Participate

This study did not require ethical approval as it did not involve human participants or the collection of identifiable personal data. All data was obtained from publicly accessible YouTube videos, which are available in the public domain. Therefore, no informed consent was necessary.

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Conflict of Interest

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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