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Social awareness to reduce emergency department admissions: Analysis of YouTube videos on pesticide poisoning

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Abstract

Pesticide poisoning is a significant public health concern that presents critical challenges worldwide. Because of the widespread agricultural use and the ease of access to these chemicals, they present significant acute and chronic health risks. With the rise of digital media, platforms like YouTube have become increasingly used to raise awareness about health issues. This study sought to assess the quality and reliability of YouTube videos on pesticide poisoning using a cross-sectional analytical method. A total of 100 English-language videos were reviewed, with 53 videos that met the inclusion criteria. Videos were evaluated considering their producer type, content quality, and adherence to international health guidelines. Metrics such as the number of views, likes, comments, and video duration were also recorded. Content was scored across seven categories: general information, symptoms, diagnosis, treatment, acute poisoning, chronic poisoning, and prevention, with a maximum total score of 100. Results showed that videos were produced by private organizations (52%), official institutions (13%), and healthcare professionals (11%). Videos created by healthcare professionals had significantly higher scores in critical categories, including symptoms, diagnosis, treatment, and acute poisoning management ($p<0.05$). YouTube has the potential to serve as a platform for disseminating information about pesticide poisoning but requires significant improvements in content quality and reliability. Encouraging healthcare professionals and official organizations to produce high-quality content, along with targeted changes to prioritize credible sources through improved algorithms, could help reduce misinformation. Such efforts have the potential to foster a more informed society while also decreasing emergency room visits related to poisoning incidents.

Keywords: Pesticide poisoning, emergency services, YouTube, digital media, social awareness

Introduction

Poisoning is a critical condition that requires specialized approaches in emergency services due to its potential to cause severe health outcomes and mortality [1]. The wide variety of substances involved in poisoning incidents leads to diverse clinical presentations and outcomes [2]. Among the various types of poisoning, pesticide poisoning stands out as a significant public health issue due to its widespread prevalence and accessibility [3,4]. Globally, millions of acute and chronic pesticide poisoning cases are reported annually, particularly in countries with extensive agricultural pesticide use [3-5]. Pesticides are implicated in approximately 20% of global suicide cases and 37% of suicide-related deaths, highlighting their significant impact on global health [6,7].

Pesticides are chemical compounds commonly used in agriculture to prevent, control, or mitigate the effects of harmful organisms, such as insects, rodents, fungi, and weeds [8]. Despite their necessity for pest control, these substances carry substantial risks to human health. These risks range from acute toxic effects to long-term complications, including neurological, reproductive, and carcinogenic outcomes [9]. To minimize these risks, strict regulation of access and usage is essential [5].

Public awareness and education are pivotal for the responsible use and effective regulation of pesticides. Disseminating accurate information is particularly critical in resource-limited settings [10]. The advent of digital media has created new opportunities to spread information about pesticide poisoning [11,12]. Platforms like YouTube are increasingly used to share

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health-related content [12,13]. While many YouTube videos aim to educate or inspire viewers, the quality and reliability of this content remain insufficiently regulated, necessitating comprehensive evaluations to ensure the dissemination of accurate and actionable information [14,15].

This study aims to evaluate the quality and reliability of pesticide poisoning content available on YouTube, chosen for its status as the most popular video-sharing platform. By analyzing this content, the study explores the potential role of digital media in addressing global health challenges and contributes to enhanced public health strategies. Furthermore, the findings highlight the importance of developing regulatory frameworks to improve the quality and reliability of online health information.

Material and Methods

This study employed a cross-sectional analytical design to evaluate the quality and accuracy of YouTube (YouTube©, https://www.youtube.com; YouTube, LLC, San Bruno, CA, USA) videos related to pesticide poisoning. Videos were assessed based on categories of content producers, viewership metrics, and adherence to guidelines established by authoritative organizations. To minimize the influence of prior user data and search history, a new YouTube account was created. Using the search term "pesticide poisoning," videos were listed by relevance, as this is the most commonly used criterion in YouTube's ranking algorithms [16]. The study included the first 100 English-language videos, consistent with existing literature, with no restrictions on the upload date [11,12,16,17].

The suitability of these 100 videos was evaluated based on the observation that users typically do not view beyond the first 100 results. Videos unrelated to pesticide poisoning or duplicate content were excluded from the analysis. Short videos (under 30 seconds) were excluded as they are unlikely to provide sufficient educational content or meet the evaluation criteria for detailed health-related information. Advertisements appearing in search results or embedded within videos were excluded from analysis. The video listing and analysis process was completed on December 31, 2024. Metrics such as the number of views, video duration, time since upload, and number of likes were recorded.

The sources of the videos included in the study were categorized into the following groups:

- **Official medical organizations:** Universities, professional associations, and similar institutions.
- **Healthcare professionals:** Doctors, paramedical staff, and other healthcare workers identified based on their professional roles.
- **Private institutions.**
- **Patients or patient relatives.**
- **News outlets.**
- **Unidentified sources:** Uploaders using aliases or associated with groups not listed above.

Video content was evaluated based on criteria derived from the guidelines of the US Environmental Protection Agency (EPA) and the World Health Organization (WHO) [4,18]. The scoring system included the following eight categories: general information (10 points), symptoms (10 points), diagnosis (10 points), treatment (10 points), acute poisoning (10 points), agent types (30 points), chronic poisoning (10 points), and prevention (10 points). Videos were scored based on their ability to address each criterion, with responses classified as full answer (10 points), partial answer (5 points), or no answer (0 points). Each video received a total score out of 100 points based on these evaluations.

Statistical Analysis

Statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) version 22.0. The Kolmogorov-Smirnov test was employed to evaluate the normality of data distribution. For non-normally distributed numerical data, descriptive statistics included frequency (n), percentage (%), median, and interquartile range (IQR: Q25–Q75, representing the 1st and 3rd quartiles). Comparative analyses of non-normally distributed qualitative variables were conducted using the Mann-Whitney U test. Correlations between variables were assessed using Spearman's rank correlation test. A p-value of <0.05 was set as the threshold for statistical significance.

Ethics

The study evaluated publicly available videos on the YouTube platform. No interventions were conducted, and no participants were involved. Consequently, in accordance with similar studies, ethics committee approval was not deemed necessary [19,20].

Results

No repetitive videos were identified in the screening list. After excluding 14 videos that did not contain pesticide topics, 86 videos were analysed. Among these, videos lacking education (n=2) and videos without medical content (n=31) were excluded and the study was completed with 53 videos (Figure 1).

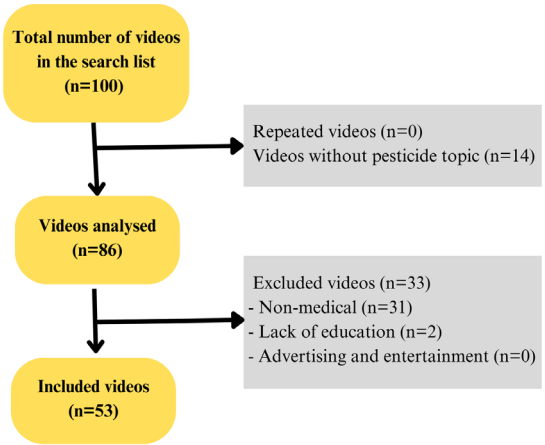

Figure 1. Study workflow

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The 53 videos included in the study were categorized based on their sources as follows: 28 videos (52%) were produced by private institutions, 7 videos (13%) by official organizations, 6 videos (11%) by healthcare professionals, 3 videos (5%) consisted of news content, and 10 videos (19%) were from unidentified sources. No content was found to have been created by patients or their relatives.

Details regarding the duration, number of views, likes, comments, and time since upload for the included videos are presented in Table 1.

No statistically significant differences were observed in metrics such as video duration, number of views, likes, or comments when comparing videos published by healthcare professionals and other sources (p>0.05).

Table 1. Characteristics of included videos

	Median	*Q25-Q75
Video duration (seconds)	248	130-443
Number of views	8761	1065-30830
Number of likes	59	4-262
Number of comments	5	0-13
Time since upload (months)	7	2-10

*Q25-Q75: 1st and 3rd quartile values

Videos published by healthcare professionals scored significantly higher in critical categories such as symptom identification, diagnosis, treatment, acute poisoning, and total scores (Table 2).

Table 2. Comparison of video evaluations based on healthcare professional authorship

	Healthcare professionals Median (Q25-Q75)		p*
	No	Yes	
General information	5 (5-5)	5 (5-10)	0.275
Symptom identification	5 (0-5)	10 (5-10)	**0.003**
Diagnosis	0 (0-0)	2.5 (0-10)	**0.047**
Treatment	0 (0-0)	5 (5-10)	**<0.001**
Acute poisoning	5 (0-5)	10 (5-10)	0.029
Agent types	0 (0-5)	2.5 (0-5)	0.789
Chronic poisoning	0 (0-0)	0 (0-0)	0.762
Prevention	0 (0-5)	2.5 (0-10)	0.166
Total score	15 (10-30)	40 (30-45)	**0.006**

*Significance values determined using the Mann-Whitney U test

Videos were categorized into two groups based on median values for duration, number of views, likes, comments, and time since upload. Longer videos achieved significantly higher scores in the prevention category and overall total scores. However, no significant relationship was observed between video evaluations and the number of views (Table 3).

Table 3. Comparison of video evaluations based on duration and number of views

	Video evaluations Median (Q25-Q75)					
	Duration			Views		
	Short	Long	*p	Low	High	*p
General information	5 (5-5)	5 (5-10)	0.080	5 (5-5)	5 (5-10)	0.424
Symptom identification	5 (0-5)	5 (0-10)	0.097	5 (0-5)	5 (0-5)	0.973
Diagnosis	0 (0-0)	0 (0-5)	0.099	0 (0-0)	0 (0-0)	0.426
Treatment	0 (0-0)	0 (0-5)	0.777	0 (0-0)	0 (0-5)	0.218
Acute poisoning	0 (0-5)	5 (0-10)	0.225	5 (0-5)	5 (0-10)	0.447
Agent types	0 (0-5)	2.5 (0-5)	0.633	0 (0-5)	5 (0-5)	0.376
Chronic poisoning	0 (0-0)	0 (0-5)	0.230	0 (0-0)	0 (0-0)	0.884
Prevention	0 (0-0)	0 (0-5)	**0.021**	0 (0-5)	0 (0-5)	0.760
Total score	15 (5-25)	25 (10-45)	**0.031**	15 (10-25)	20 (10-40)	0.450

*Significance values determined using the Mann-Whitney U test

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Similarly, no significant associations were found between video evaluations and the number of likes or comments. In contrast, videos with a shorter time since upload demonstrated significantly higher treatment scores (Table 4).

Positive correlations were identified between the general information score and the scores for symptom identification, acute poisoning, prevention, and total score. Similarly, increases in the symptom identification score were associated with higher scores in diagnosis, treatment, acute poisoning, prevention, and total score, all showing statistically significant p-values.

Table 4. Comparison of video evaluations based on number of likes, comments, and time since upload

	Video evaluations Median (Q25-Q75)								
	Likes			Comments			Upload time		
	Low	High	*p	Low	High	*p	Short	Long	*p
General information	5 (5-5)	5 (5-5)	0.863	5 (5-5)	5 (5-5)	0.779	5 (5-5)	5 (5-5)	0.991
Symptom identification	5 (0-5)	5 (0-5)	0.638	5 (0-5)	5 (0-5)	0.723	5 (0-5)	5 (0-5)	0.913
Diagnosis	0 (0-0)	0 (0-5)	0.074	0 (0-0)	0 (0-5)	0.297	0 (0-0)	0 (0-0)	0.825
Treatment	0 (0-0)	0 (0-5)	0.084	0 (0-0)	0 (0-5)	0.116	0 (0-5)	0 (0-0)	**0.015**
Acute poisoning	5 (0-5)	5 (0-5)	0.593	5 (0-5)	5 (0-5)	0.886	5 (0-5)	5 (0-5)	0.906
Agent types	0 (0-5)	2.5 (0-5)	0.480	0 (0-5)	5 (0-5)	0.096	5 (0-5)	0 (0-5)	0.148
Chronic poisoning	0 (0-0)	0 (0-0)	0.796	0 (0-0)	0 (0-0)	0.689	0 (0-0)	0 (0-5)	0.198
Prevention	0 (0-5)	0 (0-0)	0.438	0 (0-5)	0 (0-0)	0.544	0 (0-5)	0 (0-5)	0.945
Total score	15 (10-30)	20 (10-40)	0.270	15 (10-30)	20 (10-40)	0.342	20 (10-35)	20 (10-27.5)	0.718

*Significance values determined using the Mann-Whitney U test

Higher diagnosis scores were positively correlated with treatment, acute poisoning, and total scores. While treatment scores showed positive correlations with acute poisoning and total scores, they were negatively correlated with chronic poisoning scores. Additionally, acute poisoning scores demonstrated positive correlations with prevention and total scores. Both chronic poisoning and prevention scores were also positively associated with the total score. A detailed summary of these relationships is provided in Table 5.

Table 5. Correlation analysis of video evaluation scores

		General information	Symptom identification	Diagnosis	Treatment	Acute poisoning	Agent types	Chronic poisoning	Prevention
General information	**r**	1							
	p	.							
Symptom identification	**r**	0.592	1						
	p	**<0.001**	.						
Diagnosis	**r**	0.196	0.475	1					
	p	0.160	**<0.001**	.					
Treatment	**r**	0.090	0.429	0.622	1				
	p	0.521	**<0.001**	**<0.001**	.				
Acute poisoning	**r**	0.600	0.896	0.373	0.383	1			
	p	**<0.001**	**<0.001**	**0.006**	**0.005**	.			
Agent types	**r**	-0.054	-0.207	0.231	0.108	-0.126	1		
	p	0.703	0.137	0.096	0.443	0.370	.		
Chronic poisoning	**r**	0.237	0.233	-0.018	-0.281	0.263	-0.093	1	
	p	0.090	0.097	0.900	**0.044**	0.060	0.512	.	
Prevention	**r**	0.335	0.368	0.105	-0.077	0.381	-0.173	0.242	1
	p	**0.014**	**0.007**	0.454	0.584	**0.005**	0.215	0.084	.
Total score	**r**	0.673	0.877	0.571	0.475	0.868	0.085	0.301	0.425
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.546	**0.030**	**<0.001**

*Significance values determined using Spearman correlation analysis

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Discussion

This study evaluated the quality and reliability of pesticide poisoning content available on YouTube. To our knowledge, it is the first study to assess this specific topic on the platform. While YouTube holds significant potential as a tool for public health awareness, our findings reveal critical gaps in video quality and adherence to established guidelines.

Over half of the analyzed videos originated from private organizations, with only a quarter uploaded by government institutions or healthcare professionals. Similarly, Koçyiğit et al., in their study on the relationship between COVID-19 and rheumatological diseases on YouTube, found that approximately 39% of the videos came from official institutions and healthcare professionals. Their study also reported that 17% of the videos included news content, higher than the 5% observed in our study [20]. Szmuda et al., in their analysis of COVID-19 patient information videos, noted that nearly half of the content came from news-related sources [21]. These differences may be attributed to the specialized nature of pesticide poisoning, which contrasts with the global relevance and widespread discussion of COVID-19. In comparison, Krakowiak et al. reported that 60% of videos on carbon monoxide poisoning originated from private or official health-related channels, while Szmuda et al. found a similar rate of 55% in their study on narcolepsy [22,23]. Our study observed a significantly higher proportion of health-related content (85%), likely due to the limited number of news-focused videos addressing pesticide poisoning. The relatively low media coverage of pesticide poisoning, compared to the greater attention given to carbon monoxide poisoning, may also explain this disparity.

The average video duration in our study was 248 seconds, with an average of 8,761 views and 59 likes per video. Cheng et al., in their study on drug poisoning content, reported similar findings, with a mean video duration of 282 seconds, 8,276 views, and 63 likes [24]. However, the number of views, likes, and comments in our study was notably lower than those reported by Szmuda et al. in their study on narcolepsy and by Hillyer et al. in their analysis of clinical research videos [23,25]. This discrepancy may be attributed to the specialized audience for poisoning-related content, which inherently appeals to a smaller, targeted group of viewers.

When evaluating the compliance of video content with established guidelines, videos produced by healthcare professionals provided statistically significantly more accurate and reliable information. This was particularly evident in topics requiring emergency knowledge and interventions, such as symptoms, diagnosis, treatment, and acute poisoning. These findings align with prior research emphasizing the importance of authoritative sources in disseminating accurate online health information [20]. For example, Şahin et al., in their YouTube analysis on premature retinopathy, found that content produced by independent users was of significantly lower quality compared to that created by healthcare professionals [26]. Similarly, Bora et al., in their study on the Zika virus outbreak, reported that universities were the primary sources of informative videos, while misleading content was predominantly produced by independent users [27]. However, no statistically significant differences were observed in chronic poisoning and prevention-related topics in videos prepared by healthcare professionals. This suggests that video content tends to focus more heavily on acute poisoning scenarios, likely due to their urgency and immediate relevance to viewers. Additionally, many videos uploaded by unidentified sources or private organizations often lacked scientific rigor and failed to provide comprehensive coverage of critical topics such as chronic poisoning and prevention. This highlights the need for increased involvement of governmental agencies and healthcare professionals in producing scientifically accurate and reliable video content.

Videos addressing prevention topics and achieving higher overall scores were generally longer in duration. This result is unsurprising, as detailed and comprehensive information typically requires more time to convey. However, no statistically significant association was observed between video compliance with guidelines and engagement metrics such as likes, comments, and views. This suggests that viewers may lack the necessary knowledge to discern high-quality, guideline-compliant content from inaccurate or incomplete videos. Consequently, erroneous or incomplete information may be viewed and engaged with at similar rates to reliable and well-researched content. Bora et al. found that lower-quality videos were more frequently viewed in their study, highlighting a concerning trend [27]. In contrast, Delli et al. reported that more useful videos received higher viewership [28]. These contradictory findings reflect an ongoing debate in the literature, underscoring the critical importance of ensuring that video content is accurate, reliable, and scientifically grounded to mitigate the risks posed by misinformation.

Official institutions should be given an active and prioritized role on the YouTube platform [28]. Videos should rely on evidence-based references [29]. As Athanasopoulou et al. stated, when a medical term is searched, the algorithm should prioritize directing users to reliable health-related resources [30]. Additionally, archiving YouTube videos based on their compliance with medical literature should be considered. This approach could prevent incomplete or erroneous content from misleading users. General users frequently turn to YouTube for advice on first aid during emergencies [31]. For instance, Katipoğlu et al. revealed the severity of the issue in their analysis of basic life support and cardiopulmonary resuscitation (CPR) videos, where a significant proportion provided incorrect recommendations [14]. Similarly, in a review of publicly available resources on CPR, Alexei Birkun reported that 25% of the content contained misinformation that could result in injury or death [32]. The presence of such misinformation in critical life-saving procedures underscores the magnitude of the public health problem we face.

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To address these challenges, organizations such as the WHO and EPA could play a pivotal role in establishing standardized criteria for health-related content on YouTube. This would provide clear guidance to content creators and viewers alike. Furthermore, initiatives to enhance digital literacy among users are essential to empower audiences to critically assess the credibility of online health resources. Cranwell et al., in their study on YouTube popular music videos promoting alcohol consumption, highlighted the impact of online media on public behavior, reinforcing the need for improved regulation and oversight [33].

Limitations

The findings of this study should be interpreted with consideration of certain limitations. Firstly, the analysis was limited to English-language videos, which may have excluded relevant content in other languages. While the first 100 videos listed were all in English, and thus no exclusions were made based on language, a broader range of videos could potentially be accessed by utilizing keywords in other languages specific to different regions or countries. Second, the cross-sectional design of the study may have restricted the ability to assess temporal changes in video quality. Third, there is currently no customized or validated scoring system available for evaluating the usefulness of video content related to pesticide poisoning. Official institutions should address this gap by developing guidelines to standardize and improve the quality of video content on this topic. Finally, as the content of YouTube videos on pesticide poisoning is dynamic and subject to change over time, the findings of this study reflect the usefulness of the information only at the time of analysis.

Conclusion

YouTube shows promise as a platform for disseminating information about pesticide poisoning, but significant efforts are needed to enhance its reliability as a public health resource. There is a pressing need for more comprehensive and accurate videos to address the increasing demand for high-quality educational content. Governmental organizations and health professionals must take greater responsibility by producing reliable and up-to-date materials, while international bodies like the WHO should actively support these efforts. To improve its impact, YouTube should refine its algorithm to highlight videos from verified sources. The recent introduction of "health resources," which prioritizes content from accredited professionals in select countries, is a positive development but remains limited in scope. Expanding such initiatives and ensuring broader implementation are crucial steps forward. Additionally, the platform should regularly review existing content and restrict access to outdated videos that may no longer be relevant or accurate. Both content creators and YouTube itself have critical roles in ensuring the platform's credibility as a public health tool. Addressing these challenges could establish YouTube as a reliable and effective medium for disseminating accurate and relevant health information on pesticide poisoning.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
The study evaluated publicly available videos on the YouTube platform. No interventions were conducted, and no participants were involved. Consequently, in accordance with similar studies, ethics committee approval was not deemed necessary.

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