Title: A Cross-Sectional Survey of Instagram to Assess Quality and Reliability of Information regarding "Tuberculosis"

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Discussion Points:

Have you ever come across Tuberculosis-related content on Instagram? If so, how confident are you in the accuracy of the information you've encountered?

#TuberculosisResearch #SocialMediaHealth #QualityContent #ReliableInformation #HealthAwareness

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- **ABSTRACT.**

Background: Tuberculosis is one of the oldest diseases known to affect humans and a major cause of death worldwide. The National Strategic Plan 2017-2025 aims to eliminate tuberculosis by 2025. Appraising knowledge and awareness of tuberculosis are essential for successful tuberculosis control, given the significance of social and psychological variables in determining health outcomes.

Methods: A cross-sectional observational study was conducted wherein, the top six hashtags related to "Tuberculosis" on Instagram, identified by the maximum number of posts were taken. A questionnaire was made for assessment of these posts based on various pre-determined categories- type of post, type of information circulated and to assess if it is "true", "false" or "cannot be determined" using the WHO Factsheet on Tuberculosis & CDC.

Result: 370 posts found to be relevant as per the inclusion criteria, and had a vast interaction by the users. These posts created and uploaded by the health and wellness industry comprised of 27.02%, followed by doctors at 20.27% and news agencies at 5.96%. 50.54% of the posts analyzed contained a description of tuberculosis and 20% about prevalence and diagnosis The posts by doctors and health and wellness industry had a statistically significant higher number of posts that contained "true" information and scored statistically significantly higher on the mean of Global Quality Scores and Reliability Scores.

Conclusion: Social-media is a powerful medium for disseminating scientific facts on TB. The government and policymakers need to develop internet-based programs and interventions to improve knowledge, attitudes, and practices towards TB.

Key Words: *Tuberculosis, Quality, Reliability, Social Media, Health Information* (Source: MeSH-NLM).

INTRODUCTION.

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*, which is mainly transmitted through droplet infection. It primarily affects the lungs causing pulmonary TB; however, it can also affect other organs of the body like the intestine, joints, meninges, bones, etc. causing extrapulmonary TB. In 2021, an estimated 10.6 million people contracted TB with the death toll reaching an estimated 1.6 million, according to the Global TB Report by the WHO. [1] India was one of the eight nations that accounted for more than two-thirds (or 68.3%) of all TB patients, with 28% of cases. Its persistent morbidity and mortality burden thus, makes it one of the major public health challenges in India. [1]

With the recent internet explosion in India leading to ease of access and increased internet penetration, there are an estimated 470 million social media users as of 2022. Internet users are increasingly relying on social media to discover and share health information. Instagram has been investigated as a health promotion modality, with some researchers emphasizing Instagram's general utility as a source of education and motivation [2-3] as well as users' experiences receiving social support via Instagram.

Additionally, health groups and professionals use this channel to share information about healthy lifestyle choices and medical knowledge for disease prevention, considering that it offers a chance to promote health awareness, self-efficacy, and treatment adherence among communities. However, these public tools can create opportunities for social and health risks as recent studies have suggested that false or misleading information about health may spread over social media more quickly than accurate information. As a result, it is critical to understand how health misinformation spreads and how it may influence choices and health habits.

Although there is widespread agreement among health professionals and policymakers regarding the importance of controlling health misinformation, little is known about the effects that the dissemination of false or misleading health messages via social media may have in the near future on public health. To address this existing lacuna, we aim to assess the quality and reliability of information related to the disease “Tuberculosis” on the social media platform Instagram.

This study aims to evaluate the type of information circulated about the disease “Tuberculosis” by categorizing them into symptoms, treatment, etc, to assess the authenticity of this information by verification with official resources like WHO, and to suggest measures for improving access to authentic information on Instagram by the population.

METHODS

A cross-sectional type of observational study was conducted virtually over a period of ten days. Instagram – a widely used social media platform, was used to assess the information available about the disease "Tuberculosis". The top five hashtags were identified by the maximum number of posts - #tuberculosis, #tuberculosisawarenss, #tuberculosistreatment, #tuberculosiswarrior, and #tuberculosisdiagnosis. Each author was allotted one hashtag for further analysis. The authors analyzed the top ten posts under the allotted hashtags each day for ten days. Posts in language "English" or "Hindi" and containing information about the disease "Tuberculosis" were included in the study; while the rest were excluded. A questionnaire was made for assessment of these posts based on various pre-determined categories- Information about the post, information about the disease "Tuberculosis" and to assess if this information is "true," "false," or "cannot be determined." As per World Health Organization Factsheet on Tuberculosis & CDC guidelines, correct posts were deemed to be proving "true" information, otherwise labeled as "false."

The reliability and the quality of the posts were determined by using the Reliability Score and Global Quality Score respectively. [4]

Data was entered in Excel and analyzed using the function tool. Statistical analysis was performed using SPSS software and the value of significance was calculated using T-test for mean and standard deviation and Z-test for percentages.

RESULTS.

A total of 370 posts were considered relevant and included in the study after applying the inclusion and exclusion criteria. Table 1 shows the number of posts belonging to each hashtag that was included in the study. Maximum posts belonged to #tuberculosistreatment, followed by #tuberculosis.

Table 2 shows the characteristics of the posts analyzed based on the type of post (image or video) and their interaction with users (number of likes and comments).

Figure 1 depicts the owner of the posts (doctor, pharmaceutical industry, etc, who created and uploaded the post). The 370 posts had a wide reach evidenced by 66048 likes and 1823 comments by the users. However, only 20% of the posts were created and uploaded by doctors.

Table 3 shows the type of information about tuberculosis circulated by the posts. 50% of posts gave descriptive information about the disease and 20% of posts revealed information about prevalence and diagnosis.

Out of all the posts analyzed, the information circulated in them was “true” in 287 posts (77.57%), “false” in 3 posts (0.81%) and it “could not be determined” in 80 posts (21.62%).

55 out of the 370 analyzed posts (14.86%) had promotional content whereas 315 posts (85.14%) had no promotional content.

After proper training of each author about analyzing the quality and reliability of the posts, each one assessed the posts independently under the hashtag allotted to them.

The quality of posts was analyzed using Global Quality Score. The posts were rated from “Very Low” quality to “Very high” quality using pre-determined criteria (Table 5). The reliability of the posts was analyzed using Reliability Score. The calculation of the reliability score uses five questions – the answer to the question “yes” is scored as point one and “no” is scored as zero. The total score of five questions is calculated for each post. These five questions are (1) Are the aims clear and achieved? (2) Are reliable sources of information used? (3) Is the information presented balanced and biased? (4) Are additional sources of information listed for patient reference? (5) Does it refer to areas of uncertainty?

The total number of relevant posts was divided into two groups. The information posted by doctors and others in the healthcare industry involved in active patient care was grouped into group A and all others into group B. (Tables 5 and 6). There was a significant difference in the number of “true” posts (p value=0.000085), Global Quality Score (p value= 0.0018), and Reliability Score (p-value =0.0007) between the two groups. (Tables 5 and 6)

DISCUSSION.

In this study, 370 posts were found to be relevant using the inclusion criteria and had a vast interaction by users on Instagram with 66048 likes and 1823 comments. The health and wellness industry created and uploaded these posts comprising 27.02% of the total posts, followed by doctors at 20.27% and news agencies at 5.96%. However, it was interesting to note that 38.64% of the posts came from various miscellaneous sources with the majority from pages dedicated solely to the purpose of TB awareness and education. 14.86% of the posts had promotional content. Around 50.54% of the posts analyzed contained descriptions of tuberculosis and 20% had information about prevalence and diagnosis. Another study by Fickman et al. [5] about content analysis related to COVID-19 on Instagram had “diagnosis and prevention” as major themes in the reviewed posts.

Most posts (77.57%) in our study had “true” information about tuberculosis.

The posts created and uploaded by doctors and the health and wellness industry had a statistically significant higher number of posts that contained “true” information ($p < 0.05$) and scored statistically significantly higher on the mean of Global Quality Scores and Reliability Scores.

Some studies similarly revealed that Internet users trust expertise-based information sources over experience-based information sources [6] whereas others found no significant difference in the perceived credibility of the content generated by doctors and laymen. [7]

Healthcare practitioners and policymakers, in addition to social media owners, can help reduce the potential harm of misleading or incorrect information transmitted through social media by directing patients to reputable sources. However, as healthcare providers are unable to control the content that is posted or discussed, there is still a high risk of misinformation. A study by Mahmud et al. [8] revealed poor knowledge, attitude, and practices toward TB among social media users.

Therefore, we recommend that doctors and healthcare professionals work in collaboration with health influencers to develop and implement communication strategies aimed at busting myths and stigmas related to TB and improving patient awareness. This strategy has been examined by previous research into Instagram suggesting that influencers provide several techniques for disseminating information that may be less possible for organizations. [9-10] Moreover, indications from social media about significant health events or trends could provide policymakers with information to guide the development of targeted and timely interventions, thereby making social media analysis immensely valuable in government policy making. [11]

So, government interventions are imminent given the impact TB has on the population, as a result, we recommend adopting a strategy to tackle online misinformation and fake news about TB ensuring only reliable and good quality information is circulated from a credible approved source. This strategy can be integrated into the government’s National Tuberculosis Elimination Program (NTEP) which has adopted various technological approaches [12] to improve patient care in the recent past, so ensuring quality TB content will only strengthen this approach. Fact-checking teams can be established to mitigate the spread of

misinformation by efficiently identifying and verifying unreliable content. The social media and technology industries can also use artificial intelligence (AI) as a supplement to combat misinformation, like the detection of false news. [13] Since AI is easily trainable to identify examples of news that are factually accurate, and by leveraging AI's ability to detect anomalies or deviations from the norm, it is possible to develop a solution that can continuously monitor, compare, and report on the factual accuracy of posts.

This study had some limitations, including the possibility of posts being repeated if they contained multiple hashtags. Although our sample size was small, this was done on purpose because users typically only view the top few posts that catch their attention, rather than going through all the available posts. In addition, because Instagram lacks the feature to authenticate credentials, we were unable to verify the doctor's qualifications or those of the health and wellness industry. We are also aware that, despite receiving a large number of likes and comments, we were unable to estimate the precise number of users who viewed the posts. This estimate could have been significantly higher, but we lacked the resources necessary to ascertain it.

In conclusion, the posts created and uploaded by doctors and the health and wellness industry had a statistically significantly higher number of posts with “true information”, a higher mean Global Quality Score, and Reliability score. To achieve the End-Tb Goal of 2030, the policymakers should join hands with doctors and the health-wellness industry to ensure that correct information is being circulated on social media like Instagram and the use of artificial intelligence software will promptly help to identify incorrect information and thereby stop misinformation from being circulated.

SUMMARY - ACCELERATING TRANSLATION

Title: Assessing the Quality and Reliability of Tuberculosis Information on Instagram

Summary: Tuberculosis (TB) is a centuries-old disease that continues to be a significant global health concern. In an effort to control and eliminate TB, it is crucial to understand people's knowledge and awareness of the disease. With the rise of social media as a platform for health information, this study examined the quality and reliability of TB-related information on Instagram.

Over a period of ten days, researchers conducted a virtual cross-sectional survey on Instagram to evaluate the information shared under the top six hashtags related to tuberculosis. The study focused on posts in English or Hindi that contained information about TB. A questionnaire was developed to assess various aspects of the posts, such as the type of information and its accuracy, using reliable sources like the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC).

A total of 370 relevant posts were analyzed, with a significant level of engagement from users, including 66,048 likes and 1,823 comments. The posts were primarily created by the health and wellness industry (27.02%), followed by doctors (20.27%) and news agencies (5.96%). Approximately half of the posts included descriptions of TB, while 20% discussed prevalence and diagnosis.

The study found that posts created by doctors and the health and wellness industry were more likely to contain accurate information compared to other sources. These posts also received higher scores for overall quality and reliability. This highlights the importance of reliable sources when seeking health information on social media platforms.

The findings suggest that social media can serve as a powerful tool for disseminating accurate scientific information about TB and other diseases. However, it is essential for governments and policymakers to develop internet-based programs and interventions to improve knowledge, attitudes, and practices related to TB.

This study underscores the need for individuals to critically evaluate the information they encounter on social media platforms. When searching for health-related information, it is advisable to rely on reputable sources such as government health agencies, medical professionals, and established health organizations. By being cautious about the sources of information and verifying its accuracy, individuals can make better-informed decisions regarding their health.

Additionally, healthcare professionals and organizations should consider utilizing social media platforms to educate the public about TB and promote reliable sources of information. By actively engaging with social media users, healthcare providers can help combat misinformation and provide accurate information about TB prevention, diagnosis, and treatment.

In conclusion, while social media platforms like Instagram can be valuable sources of health information, it is crucial to critically assess the reliability and accuracy of the content. Government initiatives, along with the active

involvement of healthcare professionals, are needed to ensure that accurate and trustworthy information about TB is readily available to the public. With improved knowledge and awareness, we can work towards reducing the burden of TB and achieving the goal of its elimination by 2025.

REFERENCES.

1. WHO GLOBAL TUBERCULOSIS REPORT 2022 , Available from: https://doi.org/10.1016/S2666-5247(22)00359-7 Updated: [2022 Dec 12] Cited: [2023 Jan 31]
2. Chung C, Agapie E, Schroeder J, Mishra S, Fogarty J, Munson SA: When personal tracking becomes social: examining the use of Instagram for healthy eating Proc SIGCHI Conf Hum Factor Comput Syst. 2017, 2017:1674-1687. 10.1145/3025453.3025747
3. Kamel Boulos M, Giustini D, Wheeler S: Instagram and WhatsApp in health and healthcare: an overview. Future Internet 2016, 8:37. doi:10.3390/fi8030037
4. Jung MJ, Seo MS: Assessment of reliability and information quality of YouTube videos about root canal treatment after 2016 BMC Oral Health. 2022221, 494-2022. doi:10.1186/s12903-022-02540-4
5. Fatemeh Niknam, Mahnaz Samadbeik, Farhad Fatehi, Mohammad Shirdel, Mahboobeh Rezazadeh, Peivand Bastani: COVID-19 on Instagram: A content analysis of selected accounts. Health Policy and Technology, Volume. 2021:165-173. doi:10.1016/j.hlpt.2020.10.016
6. Eastin MS: Credibility assessments of online health information: the effects of source expertise and knowledge of content J Comput Mediat Commun. 2001, 6: doi:10.1111/j.1083-6101.2001.tb00126.x
7. Hu Y, Sundar SS: Effects of online health sources on credibility and behavioral intentions. Commun Res. 2009, 25:105-132. doi:10.1177/0093650209351512
8. Mahmud S, Mohsin M, Irfan SH, Muyeed A, Islam A: Knowledge, attitude, practices, and determinants of them toward tuberculosis among social media users in Bangladesh: A cross-sectional study PLoS One. 20221710, 0275344-2022. doi:10.1371/journal.pone.0275344
9. Pilgrim K, Bohnet-Joschko S: Selling health and happiness how influencers communicate on Instagram about dieting and exercise: mixed methods research BMC Public Health. 2019, 19:1054. doi:10.1186/s12889-019-7387-8
10. Liu S, Jiang C, Lin Z, Ding Y, Duan R, Xu Z: Identifying effective influencers based on trust for electronic word-of-mouth marketing: A domain-aware approach. Inform Sci. 2015, 306:34-52. doi:10.1016/j.ins.2015.01.034
11. Yeung D: Social Media as a Catalyst for Policy Action and Social Change for Health and Well-Being: Viewpoint. J Med Internet Res. 2018, 19:94. doi:10.2196/jmir.8508.
12. Needamangalam Balaji J, Prakash S, Park Y, Baek JS, Shin J, Rajaguru V, Surapaneni KM: A Scoping Review on Accentuating the Pragmatism in the Implication of Mobile Health (mHealth) Technology for Tuberculosis Management in India. J Pers Med. 2022, 28:1599. doi:10.3390/jpm12101599.
13. Ozbay FA, Alatas B: Fake news detection within online social media using supervised artificial intelligence algorithms. Physica A: statistical mechanics and its applications. Volume 540, 2020, 123174, ISSN 0378-4371, https://doi.org/10.1016/j.physa.2019.123174.

FIGURES AND TABLES.

Figure 1.

Owner of the posts (created and uploaded the post)

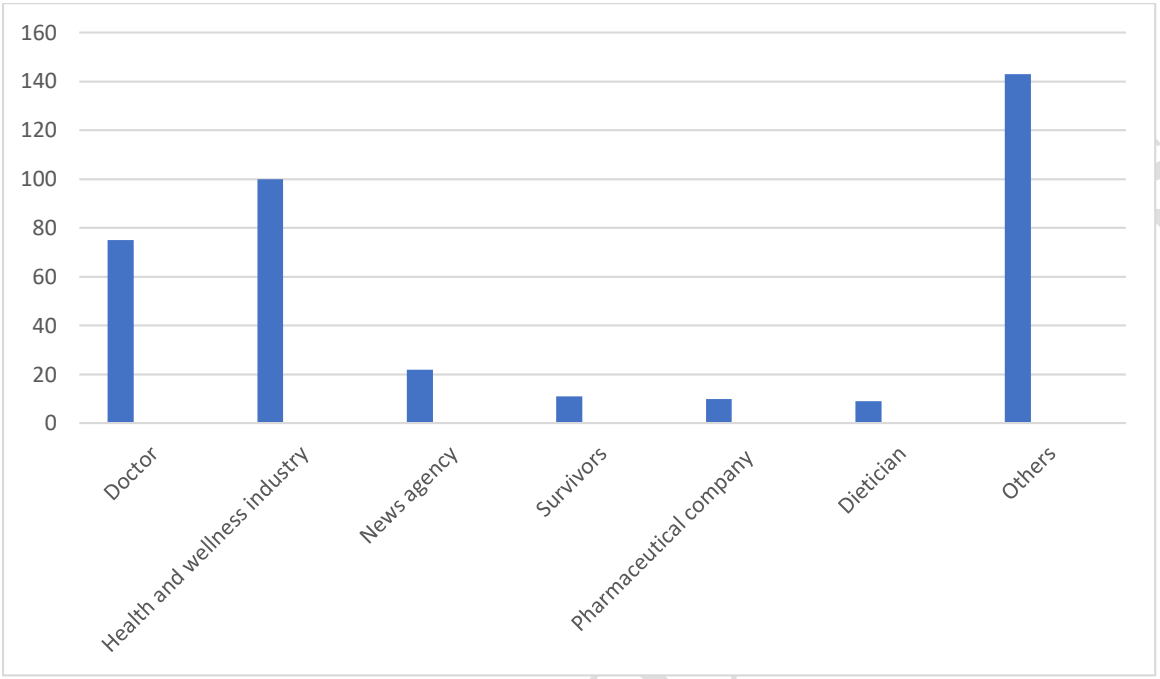

Table 1.

Number of Relevant Posts Identified under each Hashtag

Hashtag name	Number of relevant posts
#tuberculosis	80
#tuberculosisawareness	71
#tuberculosistreatment	102
#tuberculosiswarrior	38
#tuberculosisdiagnosis	79
Total	370

Table 2.

Characteristics of the Posts Analysed

	N	Percentage
Type of post		
Image	333	90%
Video	37	10%
Engagement with users		
Total no. of likes	66048	
Total no. of comments	1823	

Table 3:

Type of Information about Tuberculosis Communicated by the Posts

	N	%
Description	187	50.54
Prevalence	75	20.27
Symptoms	62	16.76
Diagnosis	75	20.27
Screening	61	16.49
Prevention	56	15.14
Treatment	58	15.68
Mortality	14	3.78
Rehabilitation	5	1.35
Support Groups	11	2.97
Patient sharing their own experience	13	3.51
Parents sharing experience with family members	4	1.08

Table 4: Quality and Reliability of The Posts

		N	%
Global Quality Score			
1	Very low (Poor quality, poor flow of the site, most information missing, not at all useful for patients)	100	27.03
2	Low (Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients)	106	28.65
3	Medium (Moderate quality, suboptimal flow, some important Information is adequately discussed but others poorly discussed, somewhat useful for patients)	118	31.89
4	High (Good quality and generally good flow, most of the relevant information is listed, but some topics not covered, useful for patients)	39	10.54
5	Very High (Excellent quality and excellent flow, very useful for patients)	7	1.89
Reliability Score			
1	Very Low	115	31.08
2	Low	96	25.95
3	Medium	97	26.21
4	High	50	13.51
5	Very High	12	3.24

Table 5: Comparison of the Posts having “True” information in the Group A and Group B

	Group A (n=205) (Posts created and uploaded by doctors and health & wellness industry)	Group B (n=165) (Posts created by those not included in Group A)
Posts having “true” information	174	113
Percentage	84.88%	64.48%
P value = 0.000085 (Significant, p value <0.05)		

Table 6: Comparison of the Mean of Global Quality Score and Reliability Score of the Posts in the Group A and Group B

	Group A (Posts created and uploaded by doctors and health & wellness industry)	Group B (Posts created by those not included in Group A)
Global Quality Score		
Mean ± SD	2.47 ± 1.00	2.13 ± 1.07
P value = 0.0018 (Significant; p<0.05)		
Reliability Score		
Mean ± SD	2.50 ± 1.12	2.10 ± 1.13
P value = 0.0007 (Significant; p<0.05)		