Infodemics during era of COVID-19 pandemic: A review of literature

Lokesh D. Sharma¹, Krupal J. Joshi², Tejas A. Acharya³, Manish G. Dwivedi⁴, Ghanashyam B. Sethy⁵

¹School of Business and Management, Jaipur National University, Jaipur, Rajasthan, ²Department of Community and Family Medicine, AIIMS, Rajkot, Gujarat, ³Department of Pharmacology, C. U. Shah Medical College, Surendranagar, Gujarat, ⁴School of Business Management, Jaipur National University, Jaipur, Rajasthan, India, ⁵UNICEF Malawi Country Office, Lilongwe, Malawi

ABSTRACT

The coronavirus disease 2019 (COVID-19) pandemic, caused by the new coronavirus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has spread across the globe and has affected the health of millions of people. During the pandemic, social media was the major source of information for isolated and anxious people. Infodemics is defined as “an overburden of information – some accurate and some not – that makes it hard for people to find trustworthy source and reliable guidance when they need it.” Misinformation raised out of infodemics during COVID-19 created many serious issues regarding the prevention and treatment of COVID-19. With the help of available literature, we aimed to review the role of infodemic in relation to worsening of COVID-19 spread and vaccine utilization with possible preventable measures to control infodemic. Various social media platforms were a major source of infodemic. The active role of world agencies, narrative guidelines by the local authority, use of artificial intelligence (AI) by social media platforms and active participation of community and health care professionals can control infodemics effectively.

Keywords: COVID-19, COVID-19 vaccine, infodemics, pandemic

Introduction

The coronavirus strains have been known since 1960 and cause 15% common cold in humans each year.[9] In 2002, severe acute respiratory syndrome (SARS) and in 2012, Middle East respiratory syndrome were the severe illnesses caused by the coronavirus, but they were limited to epidemics and none declared pandemic like severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[10] The coronavirus disease 2019 (COVID-19) pandemic, caused by the new coronavirus SARS-CoV-2, has spread across the globe and has affected the health of millions of people.[10] To control the spread of the novel coronavirus without effective treatment or vaccine, various restrictions ranging from social distancing to complete lockdown were implemented across the world.[11] Isolated people felt more anxious and in the absence of social support, social media was the major source of information regarding pandemics and every circumstance created due to pandemics.[12] Facebook, YouTube, WhatsApp, and Twitter are the most prominent social media of the present age with billions of users. Social media like WhatsApp which is peer-to-peer encrypted makes it difficult for public officials and researchers to track misinformation.[13] Social media platforms provide direct access to an extraordinary amount of content and may amplify rumors and doubtful information.[14] Infodemics is defined as “an overburden of information – some accurate and some not – that makes it hard for people to find trustworthy source and reliable guidance when they need it.”[15]

Address for correspondence: Dr. Krupal J. Joshi, Department of Community and Family Medicine, AIIMS, Rajkot, Gujarat, India. E-mail: dr.krupaljoshi@gmail.com

Received: 19-12-2021 Revised: 09-02-2022 Accepted: 11-02-2022 Published: 30-08-2022

How to cite this article: Sharma LD, Joshi KJ, Acharya TA, Dwivedi MG, Sethy GB. Infodemics during era of COVID-19 pandemic: A review of literature. J Family Med Prim Care 2022;11:4236-9.
A term coined by the World Health Organization (WHO) to describe the spread of misinformation on the virus, infodemic makes it difficult for people to find reliable resources to obtain clear info by social media as people are encountering a lot of coronavirus related material on social media. Infodemics can cause confusion and risk-taking behavior which can harm an individual's health as well as can cause mistrust in health care authorities which can lengthen the outbreak. Misinformation raised out of infodemics during COVID-19 created many serious issues like false preventive measures, antivaccination arguments, vandalism towards telecommunication infrastructures, etc. If rumors, stigma, and conspiracy theories are prioritized over scientific guidelines, it may also affect the health of the public potentially. Fear arising out of infodemics and lack of access to services during lockdown created a vicious cycle that led to serious mental issues ranging from anxiety, depression to suicide in the susceptible population. Similar kinds of observations were also noted in other outbreaks that occurred previously and they revealed how misinformation can affect disease and immunization outcomes. Infodemics were also observed when vaccine rollout started after a long wait and which was the only visible hope to fight the pandemic.

After understanding all these evidences, infodemics can be considered a major threat to the public domain. We searched actively for the available literature and studies on infodemics on various platforms like PubMed, Google Scholar, etc. In this article, we aimed to review the role of infodemics in relation to the worsening of COVID-19 spread and vaccine utilization. We also reviewed possible measures to be taken to prevent infodemics during such critical situations.

Social Media

In today's age of telecommunication, social media is an unavoidable part of one's life. During the pandemic, social media platforms played a crucial role in the spread of infodemics. Zoumpourlis et al observed that in spite of banning efforts on controversial theories, big social medial platforms still contain conspiracy theories and may pose a significant health risk to the general public by creating a negative association between health-protective behaviors and the spreading of COVID-19.

Cinelli et al conducted a study by doing a comparative analysis of user's activity on five different social medial platforms (Twitter, Instagram, YouTube, Gab, and Reddit) during COVID-19 health emergency. They analyzed data for interaction patterns, the spread of information, and the role of the source of information on the above-mentioned platforms. The highest volume of interaction was observed on YouTube and Twitter and it was associated with the public announcement of COVID-19 by WHO. By using various epidemiological models, authors found that the Gab environment was more susceptible to the spread of misinformation and the source of information either reliable or questionable does not affect the spread of information.

Another study conducted by Park et al analyzed public attention on COVID-19 related topics on Twitter in four Asian countries (South Korea, Iran, Vietnam, and India). They noticed that the early days of COVID-19 pandemic involved various misinformation and hateful speech along with trending fake news in studied countries. With respect to the author’s observation regarding Indian trends, a rise in topic trends was observed as cases were rising in the country. The most debated topics were regarding local news and rumors. The study remarkably stated that with change in time during pandemics, topics of discussion remained the same in all studied countries.

Gallotti et al monitored Twitter activity and collected more than 112 million messages using a selection of words commonly used about COVID-19 during the pandemic. An interesting finding was that the level of socio-economic development of the country was not the key discriminant to separate countries with low versus high infodemics risk.

Some interesting rumors and conspiracy theories that were prominent during the COVID-19 pandemic in India and across the world are listed in Table 1.

5G Conspiracy

By analyzing 6556 Twitter users, Ahmed et al specifically focused on infodemics arising out of the link between the 5G network and the COVID-19 pandemic. The output of this study was that they found out dedicated sources created to spread this conspiracy. The authors also noted commercial purpose in spreading such misinformation. For example, in spreading the link of 5G network with covid19, the website of a company selling products that protect against electromagnetic fields was found highly influential.

COVID-19 Vaccine and Infodemics

The novel SARS-Cov-2 has triggered two parallel pandemics of biological and social as a result of which vaccines sucked into the vortex of confusing information ranging from innocently
misleading to intentionally deceiving. In the United States, vaccine misinformation was more than doubled during the COVID-19 pandemic.\(^{16}\)

Islam et al.\(^{14}\) conducted a study to review COVID-19 vaccine-related online rumors and conspiracy theories on various platforms like Google, Facebook, Twitter, Television, etc., from 52 different countries. Of all the rumors identified, the most common were regarding vaccine trial and development followed by regarding morbidity and mortality after receiving the COVID-19 vaccine. The most popular conspiracy theory was that vaccines could control the human population with microchips taking over the world.

In a unique study, Johnson et al.\(^{16}\) explored 3 billion users of Facebook across the countries and identified various clusters of users with pro- and anti-vaccination views during the COVID-19 pandemic. A prominent observation was the high involvement of the anti-vaccination cluster with the undecided cluster, while the pro-vaccination cluster was more peripheral. It signifies the future rise of anti-vaccination groups to spread infodemics.

### Infodemics and Health Care Professionals

Health care professionals are also not out of the target of infodemics. Doctors, especially primary health care doctors, have faced tremendous difficulties as they were also lacking accurate information about pathogenesis and treatment of disease caused by newly emerged COVID-19. As the primary source of health-related information for the public is their family physician, they were at the target to give authentication on information generated out of infodemics. The job of filtering scientific information out of multiple sources was like looking for a needle in a haystack. In a study conducted by Datta et al.\(^{19}\) on infodemics and health care professionals, they noticed 75% health care professionals received inaccurate information and 26% felt information on COVID-19 was making them uncomfortable, while 33% mentioned it as disturbing in their decision-making. In the same study, 74% of health care professionals felt the need to regularize information during such times.

### Measures to Fight Infodemics

Fighting infodemics is a multidimensional approach that cannot be obtained by any single-sided efforts. World health agencies, local authorities, all social media platforms and the community themselves will have to play an active role to combat the spread of infodemics.

- **Role of WHO**
  Thoughout the pandemic, WHO has played an important role by providing guidelines regarding every concerned matter of COVID-19 and infodemics is also an exception to it. WHO launched a platform called WHO information network for epidemics (EPI-WIN) with the aim of using a series of amplifiers to share tailored information with specific target groups.\(^{20}\) Throughout the pandemic, WHO officials remained in contact with big social media platforms and other international agencies. WHO is also training infodemic control managers who can efficiently play a role to control infodemics.\(^{20}\)

- **Role of health authorities**
  Health authorities of the local government are the very immediate structures that have to take concrete steps to condemn infodemics because the failure of doing so will ultimately hamper the health system. To fight infodemics, health authorities can use narrative messages describing authentic information to draw the attention of misguided people.\(^{22}\) Health authorities can also implement methods suggested by studies like epidemiological methods\(^{23}\) and framework models\(^{24}\) to counter infodemics.

- **Role of social media**
  In the context of infodemics, social media is playing the role of a double-edged sword. It is the key element of spreading infodemics, at the same time, it is the pivotal component of fighting infodemics. All major social media platforms should understand their responsibilities without falling into the game of competition and greed. Artificial intelligence (AI) can be a helping hand for social media play in combating the spread of misinformation during infodemics. AI methods can support audience analysis and improve fact-checking.\(^{28}\)

- **Role of Community**
  The community is the one who generates infodemics and also suffers from infodemics. If the community becomes alert for misinformation and learns how to filter it consciously, infodemics can be suppressed at a very subtle level. No health authority can win this battle without the active involvement of the community. The community should be part of policy makers in every decision during a pandemic so that it will prevent panic in public.\(^{26}\) Trust in policy makers can surely prevent the spread of infodemics.

- **Role of Health care professionals**
  Health professionals, especially primary care takers, can play an important role to conquer infodemics. They should remain updated regarding national and international guidelines. Primary health care takers are the conducting chain between community and health authorities. They should neither deny truth nor amplify misinformation. Any information out of their knowledge or yet to be confirmed by the scientific community, they should not hesitate in conveying it to the community. They should be able to justify to the community that medical science is evidence-based and often it takes time to generate evidence, till then we should not believe in any misinformation received by any unauthorized structure. If primary health care takers play their role actively, infodemics can be defeated at an infant stage.

### Conclusion

Infodemics is a threat to the community during a pandemic-like situation. Infodemics raised during COVID-19 proved that we failed to learn from past pandemics and repeated the same in an
exaggerated manner. Looking at growing social media dominance in society, infodemics should be viewed as an integral part of today's communication era, which cannot be stopped but can be regulated and controlled by anticipatory measures. All social media platforms should remain prepared for this and should take active measures using the latest technologies. Government authorities should work as an antidote to infodemics by generating trust and spreading correct information in society. Health care professionals should fill up the gap in the system by using their knowledge. Pandemics are not human-generated and we may be helpless in stopping it but infodemics are definitely human-generated and only we can stop it.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Ahmed W, Vidal-Alaball J, Downing J, López Seguí F. COVID-19 and the 5G conspiracy theory: Social network analysis of twitter data. J Med Internet Res 2020;22:e19458.
2. Zhu Z, Lian X, Su X, Wu W, Marraro GA, Zeng Y. From SARS and MERS to COVID-19: A brief summary and comparison of severe acute respiratory infections caused by three highly pathogenic human coronaviruses. Respir Res 2020;21:224.
3. Zoumpourlis V, Goulielmaki M, Rizos E, Baliou S, Spandidos DA. The COVID19 pandemic as a scientific and social challenge in the 21st century. Mol Med Rep 2020;22:3035-48.
4. Oraby T, Tyshenko MG, Maldonado JC, Vatcheva K, Elsaa’dany S, Alali W, et al. Modeling the effect of lockdown timing as a COVID-19 control measure in countries with differing social contacts. Sci Rep 2021;11:3354.
5. Hung M, Lauren E, Hon E, Birmingham W, Xu J, Su S, et al. Social network analysis of COVID-19 sentiments: Application of artificial intelligence. J Med Internet Res 2020;22:e22590.
6. Hollywood E, Mostrous A. The Infodemic. Fake news in the today's communication era, which cannot be stopped but can
7. Cinelli M, Quattrociocchi W, Galeazzi A, Valencisce C, Brugnoli E, Schmidt A, et al. The COVID-19 social media infodemic. Sci Rep 2020;10:16598.
8. Islam MS, Sarkar T, Khan SH, Kamal A, Hasan S, Kabir A, et al. COVID-19-related infodemic and its impact on public health: A global social media analysis. Am J Trop Med Hyg 2020;103:1621-9.
9. Zorlu F. Covid-19: Infodemic spreads faster than pandemic. Anadolu Agency. 2020. Available from: https://www.aa.com.tr/en/latest-on-coronavirus-outbreak/covid-19-infodemic-spreads-faster-than-pandemic/1786381. [Last accessed on 2021 Dec 02].
10. Infodemic. World Health Organization. Available from: https://www.who.int/health-topics/infodemic#tab=tab_1. [Last accessed on 2021 Dec 03].
11. Park S, Han S, Kim J, Molaie M, Vu H, Singh K, et al. COVID-19 Discourse on twitter in four asian countries: Case study of risk communication. J Med Internet Res 2021;23:e22727.
12. Su Z, McDonnell D, Wen J, Kozak M, Abbas J, Segalo S, et al. Mental health consequences of COVID-19 media coverage: The need for effective crisis communication practices. Global Health 2021;17:4.
13. Brainard J, Hunter. Misinformation making a disease outbreak worse: Outcomes compared for influenza, monkeypox, and norovirus. Simulation 2020;96:365-74.
14. Islam MS, Kamal A-HM, Kabir A, Southern DL, Khan SH, Hasan SMM, et al. COVID-19 vaccine rumors and conspiracy theories: The need for cognitive inoculation against misinformation to improve vaccine adherence. PLoS One 2021;16:e0251605.
15. Gallotti R, Valle F, Castaldo N, Sacco P, Domenico M. Assessing the risks of ‘infodemics’ in response to COVID-19 epidemics. Nat Hum Behav 2020;4:1285-93.
16. UNICEF. Vaccine misinformation management field guide. 2020. Available from: https://www.unicef.org/health-topics/vaccine-misinformation-management-field-guide. [Last accessed on 2021 Dec 03].
17. Byrd B, Smyser J. Lies, bots and coronavirus: Misinformation’s deadly impact on health. Grant Makers in Health; [updated 2020 Jul 17]. Available from: https://www.gh.org/views-from-the-field/lies-bots-and-coronavirus-misinformations-deadly-impact-on-health/. [Last accessed on 2021 Dec 03].
18. Johnson NF, Velasquez N, Restrepo NJ, Leahy R, Gabriel N, Oud S, et al. The online competition between pro- and anti-vaccination views. Nature 2020;582:230-3.
19. Datta R, Yadav AK, Singh A, Datta K, Bansal A. The infodemics of COVID-19 amongst healthcare professionals in India. Med J Armed Forces India 2020;76:276‑83.
20. Zarocostas J. How to fight an infodemic. Lancet 2020;395:676.
21. World Health Organization Newsletter. WHO announces 3rd global infodemic manager training. WHO; [updated 2021 Sept 01]. Available from: https://www.who.int/news-room/articles-detail/who-announces-3rd-global-infodemic-manager-training. [Last accessed on 2021 Dec 03].
22. Gesser-Edelsburg A. Using narrative evidence to convey health information on social media: The case of COVID-19. J Med Internet Res 2021;23:e24948.
23. Scales D, Gorman J, Jamieson KH. The Covid-19 infodemic-applying the epidemiologic model to counter misinformation. N Engl J Med 2021;385:678-81.
24. Tangcharoensathien V, Calleja N, Nguyen T, Purnat T, Oud S, et al. The online competition between pro- and anti-vaccination views. Nature 2020;582:230-3.
25. Luengo-Oroz M, Hoffmann Pham K, Bullock J, Kirkpatrick R, Luccioni A, Rubel S, et al. Framework for managing the COVID-19 infodemic: Methods and results of an online, crowdsourced WHO technical consultation. J Med Internet Res 2020;22:e19659.
26. Marston C, Renedo A, Miles S. Community participation is crucial in a pandemic. Lancet 2020;395:1676-8.