

Infodemiological Study of Persian Instagram Posts during the Covid-19 Pandemic

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Abstract

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Introduction: Infodemiology examines the distribution and determinants of health information in digital environments. Social media platforms, particularly Instagram, played a substantial role in disseminating Covid-19-related information during the pandemic. This study aims to conduct an infodemiological analysis of Persian-language Instagram posts during the Covid-19 pandemic.

Methods: This retrospective study employed a combined qualitative screening and quantitative descriptive analysis approach. The study population consisted of 2,000 publicly available Persian-language Instagram posts retrieved using the hashtags “Corona” and “Covid-19.” Posts were selected through Instagram’s “Top Posts” sorting function available at the time of data extraction. For each hashtag, the first 1,000 posts were collected. Data collection was conducted between November 6 and December 6, 2021. Three reviewers independently screened all retrieved posts for relevance to Covid-19, and discrepancies were resolved through consensus. Duplicate posts identified during the retrieval process were manually excluded. Relevant posts were archived using coded screenshots due to Instagram storage limitations. Data extracted from each post included content format, publication location, whether content creator identification information was available in the post or account, and, when available, the content creator’s professional background. For posts in which the content creator’s professional background could be identified, professions were classified as medically relevant or non-medically relevant. Quantitative data were analyzed using SPSS and Excel, with descriptive statistics including frequencies and percentages.

Results: Of the 2,000 posts analyzed, 72.1% were unrelated to the specified hashtags or the Covid-19 disease. Among the 558 relevant posts, 83.51% used an image-caption format. The publication location was unspecified in 74.91% of these posts. Furthermore, 90.68% lacked identifying information about the content creator, and 51.43% did not mention the creator’s professional background within the post or account.

Conclusion: A small proportion of the examined Instagram posts contained relevant Covid-19 information, and most lacked transparent authorship and professional attribution, limiting the ability to assess information quality. These findings highlight the need for improved health information governance in social media environments. Medical librarians, especially in hospital libraries and public libraries, as key stakeholders in health information management, can play an essential role in evidence-based content evaluation, curation, and dissemination in digital ecosystems. Strengthening their involvement alongside health systems may enhance the quality and reliability of online health information.

Introduction

Infodemiology, defined as the epidemiology of (mis)information, is an emerging interdisciplinary field at the intersection of consumer health informatics, public health informatics, infometrics, and web analytics (1, 2). It highlights the rapid spread and

amplification of both accurate and inaccurate health information in digital environments (3, 4). Infodemiology focuses on the systematic analysis of the distribution, determination, and impact of health-related information in digital environments,



to support evidence-based health decision-making and inform public health strategies (2). The World Health Organization (WHO) has defined an “infodemic” as an overabundance of both accurate and inaccurate information during a health crisis, which can complicate risk communication and hinder effective public health responses (5). In this regard, infodemiology has gained particular importance during the Covid-19 pandemic, as the rapid dissemination of misinformation and disinformation on digital platforms has posed significant challenges to public health communication and behavior change (6). Springer et al. demonstrated in their study that following the onset of the Covid-19 pandemic, there was a significant rise in the number of published papers on infodemiology and infoveillance, particularly between January 2020 and March 2021, highlighting increased academic interest in these fields during the global health crisis (7).

Since 2013, social media platforms have played an expanding role in the health domain, extending beyond communication to encompass support for health research and practice, facilitation of social mobilization, and coordination of offline health-related activities (8). Owing to their broad accessibility and extensive user base, social media networks have become pivotal tools for studying the dissemination of health information, particularly within the context of Covid-19 infodemiology (9). During public health emergencies such as the Covid-19 pandemic, social media platforms have been shown to facilitate the widespread dissemination of misinformation, which can negatively influence health behaviors, risk perception, and adherence to preventive measures (10–13). Notably, during the coronavirus pandemic, the utilization of social media has significantly increased (14, 15). From January 2019 to January 2020, the number of social media users increased by 9% (16). Covid-19 was first identified on December 31, 2019 (17). Since then, a wealth of information has emerged about the disease.

Instagram has emerged as a prominent platform for disseminating health-related information (18, 19). Its visual nature and widespread use allow individuals to share self-monitored health data and portray idealized health lifestyles, shaping public

understanding of wellness (19). The platform plays a significant role in visually constructing and maintaining publicly visible health identities (19, 20). By enabling users to present content that reflects their health practices and aspirations selectively, Instagram supports the circulation of health messages in a compelling and accessible format (19). Furthermore, during the Covid-19 pandemic, researchers identified Instagram as a valuable channel for bridging the gap between public health information and the general population (21).

Despite Instagram’s updated algorithms that emphasize genuine user engagement and content quality, hashtags remain valuable for enhancing the discoverability and visibility of posts (22). In practice, adding hashtags to captions or comments can make content appear on the corresponding hashtag pages, thereby increasing its potential reach (23). Given its popularity among Iranian users, which grew from 24 million in 2017 to 48 million in 2021 (24), this infodemiological study was conducted to examine the Persian-language Instagram posts produced during the Covid-19 pandemic, retrieved using the Persian equivalent hashtags “Corona” and “Covid_19. The findings of this study can provide valuable information to enhance understanding of the characteristics of Persian-language Covid-19-related posts on this platform, particularly during the pandemic, thereby supporting informed planning, policymaking, and decision-making regarding the production, dissemination, and public consumption of health information and addressing a critical gap in the existing literature.

Methods

This retrospective study employed a combined qualitative screening and quantitative descriptive analysis approach. The qualitative phase involved the content-based evaluation and classification of Instagram posts according to their relevance to Covid-19. In contrast, the quantitative phase comprised the extraction of post characteristics and the statistical analysis of the resulting dataset. The research process involved multiple stages. Initially, a dedicated private Instagram account was created specifically for the study. This

account had no followers, followings, or search history and was solely intended for data collection purposes. Subsequently, the process of gathering Instagram posts commenced, focusing on the Persian hashtags for Corona (کرونا) and Covid-19 (کووید_19). These posts were subsequently sorted using the “Top posts” option, which was available at the time of data extraction. For each of the two hashtags, the first 1,000 posts were examined, resulting in a total of 2,000 posts reviewed. It is worth noting that the entire data extraction from Instagram posts was conducted between November 6 and December 6, 2021. Due to limitations in retrieving and storing search results on Instagram, researchers had to run multiple search sessions and repeat queries. Duplicate posts were manually excluded in each session, and retrieval continued until the quota of 1,000 unique posts per hashtag was met. Three study team members independently reviewed all 2,000 posts to assess their relevance to Covid-19. The reviewers were not blinded to the study objectives. To minimize subjectivity and ensure consistency in the evaluation process, disagreements among reviewers were first resolved through discussion. When consensus could not be reached, the final decision was made by a third, independent reviewer. This multi-reviewer approach was used to enhance the reliability of the content classification process. Of the total posts, only 558 posts were found to be topically related to Covid-19 based on the Persian hashtags for “Corona” and “Covid-19.” Therefore, in the continuation of the study, the researchers focused exclusively on these relevant posts, excluding unrelated content from further analysis.

Given Instagram’s storage restrictions, screenshots of each relevant post were captured for future reference. Each screenshot was assigned a unique code based on its review sequence. This code streamlined access to the corresponding file and facilitated the recording of related data in Excel. Subsequently, data were extracted from each Covid-19–related post, including content format, publication location, the availability of content creator identification information in the post or user account, and the content creator’s professional background when available. The extracted data were recorded in Microsoft Excel for analysis. For posts in which the content creator’s professional background could be identified, professions were categorized as medically relevant or non-medically relevant. Professions related to healthcare or medical fields were classified as medically relevant, whereas all other professions were classified as non-medically relevant.

To analyze the study findings, a two-stage approach was employed. First, Instagram posts were manually screened and classified according to their relevance to Covid-19. Second, data extracted from the relevant posts were analyzed using descriptive statistics and summarized using frequencies and percentages.

Results

Table 1 indicates that 88.9% of posts with the Persian equivalent hashtag of “Corona” and 55.3% with “Covid-19” were unrelated. In total, 72.1% of the 2000 posts did not concern the disease. In fact, only 558 posts (27.9%) were relevant to the two hashtags, which were the focus of further analysis.

Table 1. Distribution of the posts according to their relevance to Covid-19 by hashtag

English equivalent of Persian hashtags	Number of reviewed posts	Relevant posts		Irrelevant posts	
		Number	Percent	Number	Percent
Corona	1000	111	11.1%	889	88.9%
Covid-19	1000	447	44.7%	553	55.3%
total	2000	558	27.9%	1442	72.1%

As shown in Table 2, out of a total of 111 posts associated with the Persian equivalent hashtag “Corona”, the highest number of related posts were in the image-based text-captions format (74.78%), while the lowest were in the video format (1.8%). Similarly, among a total of 447 posts associated with the Persian hashtag “Covid-19”, the largest

share of related posts used the image-based text-caption format (85.69%). The lowest number of related posts, such as the “corona” Persian hashtag, was in the video format (0.22%). Overall, 83.51% of the 558 related posts used the image-based text-caption format, and less than 1% used the video format.

Table 2. Distribution of post formats among Covid-19-related posts by hashtag

Post formats English equivalent of Persian hashtags	Image-based text-caption		Video-caption		Image-based text		Image-caption		Video		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Corona	83	74.78	17	15.32	5	4.50	4	3.60	2	1.80	111	100
Covid-19	383	85.69	43	9.62	9	2.01	11	2.46	1	0.22	447	100
total	466	83.51	60	10.57	14	2.51	15	2.69	3	0.54	558	100

Table 3 illustrates the distribution of the publication location status for posts associated with the Persian equivalent hashtags “Corona” and “Covid-19”. According to the findings presented in this table, the publication location was not specified in 69.37% of

the 111 posts related to the hashtag #Corona and in 76.28% of the 447 top posts related to the hashtag #Covid-19. Overall, the publication location was unspecified in 74.91% of the posts associated with both hashtags.

Table 3. Distribution of specific and non-specific publication locations among Covid-19-related posts by hashtag

Publication location English equivalents of Persian Hashtags	Specific		Non-specific		Total	
	Number	Percent	Number	Percent	Number	Percent
Corona	34	30.63	77	69.37	111	100
Covid-19	106	23.72	341	76.28	447	100
total	140	25.09	418	74.91	558	100

Table 4 presents the distribution of the availability of content creator identification information in posts or user accounts associated with the examined hashtags. According to Table 4, 81.08% of the 111 posts related to the hashtag “Corona” and 93.06%

of the 447 posts related to the hashtag “Covid-19” lacked content creator identification information in the post or account. Overall, in 90.68% of the 558 posts examined, the creator’s details were not mentioned in the post or account.

Table 4. Availability of content creator identification information in posts or user accounts by hashtag

Hashtags in Persian (English equivalent)	Identification information				Total	
	Available		Unavailable			
	Number	Percent	Number	Percent	Number	Percent
Corona	21	18.92	90	81.08	111	100
Covid-19	31	6.94	416	93.06	447	100
total	52	9.32	506	90.68	558	100

As shown in Table 5, among the 111 posts retrieved using the Persian equivalent of the hashtag Corona, the content creator's professional background was unavailable in 27.03% of posts. Among the posts in which the professional background was identified, 41.44% were created by individuals whose professional background was non-medically relevant. Among the 447 posts retrieved using the Persian equivalent of the hashtag Covid-19, the

content creator's professional background was unavailable in 57.49% of posts. In contrast, 13.43% of the identified professional backgrounds were classified as non-medically relevant. Overall, the professional background of the content creator was unavailable in 51.43% of the Covid-19-related posts, and in 19.00% of all posts, the identified professional background was non-medically relevant.

Table 5. Distribution of content creator professional background availability

English equivalent of Persian Hashtags	Available				Unavailable		Total	
	Medically relevant		Non-medically relevant		Number	Percent	Number	Percent
	Number	Percent	Number	Percent				
Corona	35	31.53	46	41.44	30	27.03	111	100
Covid-19	130	29.08	60	13.43	257	57.49	447	100
total	165	29.57	106	19	287	51.43	558	100

Discussion

An analysis of 2,000 Instagram posts with the Persian equivalent hashtags “Corona” and “Covid-19” revealed that 72.1% of these posts were unrelated to the retrieved hashtags, indicating that content creators used these hashtags solely to increase the visibility of their posts. The study's results showed that content creators used the Persian equivalent hashtag for “Corona” more frequently than “Covid-19” for tagging unrelated posts. Specifically, 88.9% of the 1,000 posts retrieved with the Persian equivalent hashtag of #corona was unrelated, whereas 55.3% of the

1,000 posts examined with the hashtag “Covid-19” were unrelated. This finding might be attributed to the more specialized nature of the Persian equivalent keyword for “Covid-19” compared to “Corona”. On the other hand, it seems in Persian the pronunciation, memorability, and recall of Corona is easier compared to Covid-19. Therefore, content creators have used the Persian equivalent hashtag of “Corona” more frequently than “Covid-19” to increase the visibility of their unrelated posts. This is why the unrelated posts retrieved with the hashtag “Corona” have a larger share. The study by Rovetta and Bhagavathula on the circulation of infodemic

monikers on Google and Instagram contradicts the findings of the present study, as 66.1% of the information related to the coronavirus on Instagram was tagged with the hashtags #Covid-19 and after that with the #Coronavirus. This discrepancy might be due to language differences, the time frame of the study and the differences in the research population. The aforementioned researchers examined internet search behaviors and activities related to the Covid-19 pandemic using Google Trends and Instagram hashtags during the period from February to May 2020 (25).

The findings of the present study also indicated that a total of 72.1% of the posts containing the two examined hashtags were irrelevant, and only 27.9% of the posts were related to the mentioned hashtags. These findings are consistent with the results of Zhang and Earp's study, which examined the usefulness of Instagram posts for users seeking information on common hand injuries and found that 66% of the retrieved posts with the examined hashtags were irrelevant (26). Given the findings of the present study, it can be inferred that Instagram is an inadequate platform for acquiring pertinent information about Covid-19. This is due to the fact that the volume of irrelevant posts tagged with the Persian equivalent hashtags "Corona" and "Covid-19" surpasses the number of relevant posts on this social network. It seems that in this popular platform, content creators can easily deceive audiences and increase the searchability and visibility of their posts by using irrelevant but trending hashtags. This practice, especially in the health domain, may have undesirable consequences for individual and public health, leading to wasted time for health information seekers and sometimes even diverting their information-seeking path. Therefore, it seems necessary for Meta Platforms Inc. to adopt deterrent policies to prevent exploitative tagging behaviors.

The findings of the present study indicate that the Image-based text - caption format is the predominant format for the majority of relevant posts retrieved with both the "Corona" (74.78%) and "Covid-19" (85.69%) Persian equivalent hashtags. Overall, 83.51% of the relevant posts presented their content in the Image-based text - caption format. Given

Instagram's image-based nature (27), this result is not unexpected. In the study by Taghi Pana and Nowkarizi, 73.3% of the content of the examined posts was also in the form of image and image-caption (28). The results of the present study show that those involved in producing the content of the examined posts preferred to publish posts in the image format and were less inclined to publish posts in video format on Instagram. The lower usage of the video format may be due to the difficulties related to the upload and download speeds of videos compared to image.

The findings regarding the inclusion of location tag for posts related to hashtags indicate that in 74.91% of the examined posts, the location was not specified, and only 25.09% of the posts included a location tag. Instagram's geotags represent the latitude and longitude coordinates of physical locations, which can be added to Instagram posts or stories (29). A multitude of factors influence user geotagging behavior on social media. Chan et al. examined this phenomenon within the context of Instagram, leveraging the Uses and Gratifications Theory and Goal Theory to identify the psychological drivers of such behavior. The authors categorized users' motivations into two primary frameworks: task-involved goals and self-involved goals. Their findings revealed that altruistic and utilitarian motives—specifically contribution, memory preservation, and reputation enhancement—significantly bolster user satisfaction. Notably, memory aid emerged as the most potent predictor of satisfaction, whereas the desire for 'showing off' failed to demonstrate a significant positive relationship with user satisfaction. Furthermore, the study established a compelling link between geotagging satisfaction and sustained location-based information sharing, suggesting that this practice is an intrinsic component of user engagement strategies (30). Regardless of the motivation behind using geotags, their utilization can lead to enhanced user interaction. By displaying the user's location on the map, users who include these tags in their posts have a higher chance of being visible compared to those who do not mention the location in their posts (31, 32). Posts with location tags have 79% more engagement compared to posts

without location tags. This is because individuals who click on the location tag can view all other posts uploaded by various users at that location (32). Given that most of the post creators in the study did not use geotags, it can be inferred that they were either unaware of the benefits of geotagging or indifferent to these benefits.

The findings show that in 90.68% of posts associated with the Persian equivalent hashtags “Corona” and “Covid-19”, the content creator identification information was not disclosed. This indicates that most content creators published these posts anonymously. Such anonymity may undermine the credibility of the health information shared. Studies evaluating health-related websites highlight the visibility of the author or publisher, known as the Authorship criterion, as a key evaluation factor (33, 34). In 1997, JAMA's criteria for assessing medical websites identified authorship as essential (35), a view echoed in the U.S. National Library of Medicine's updated 2023 checklist, which emphasizes the importance of identifying the website's creator and its purpose (36). Thus, the absence of author details can be a notable drawback for these posts or accounts.

An analysis of the 558 relevant posts across both hashtags revealed that creators disclosed their professional expertise, either within the post or on their account profile, in 48.57% of cases. Notably, only 29.57% of the disclosed expertise was directly related to the health domain. The findings of the research by Gupta and Dorfman regarding the use of hashtags related to plastic surgery on Instagram revealed that a significant number of posts were created by physicians who lack specialized certification (37). Similarly, the findings of Park et al. on the content and sources of top dermatology posts on Instagram revealed that a significant portion of the posts were made by individuals without formal expertise in this field (38). Therefore, the research by Gupta (37) and Park (38) aligns with the present study's results. Since, in website evaluations, mentioning the creator or provider's details, as well as their expertise and organizational affiliation, is of great importance (39), the absence of such information can cast doubt on the credibility of the presented

content. According to the findings, it can be stated that in more than half of the examined posts, the identity information and the expertise of the content creator were either not mentioned or were mentioned incompletely. Additionally, in more than half of the posts where expertise was mentioned, it was often irrelevant. The World Health Organization warned about the rapid spread of misleading information during the Covid-19 pandemic, highlighting its potential harm to human health (40). The viral spread of misleading information online can lead to widespread public panic and have devastating real-world consequences. The dissemination of such information can significantly impact individuals' decisions and behaviors on both social and personal levels. Moreover, a lack of awareness regarding the risks of misleading information can distort individuals' understanding and reactions to social media posts (41). Experts suggest that the widespread use of social media like Instagram has facilitated the spread of false information (42). The ability to freely disseminate information on these platforms can sometimes lead to the propagation of incorrect content (43). Given the greater impact of image-based content on audiences, the dissemination of such information on Instagram has caused panic, fear, and rumors about the pandemic during the quarantine period (44). Due to concerns about the spread of misinformation on social networks, especially during the Covid-19 pandemic, some researchers argue that public health regulatory systems need to have a stronger presence in the digital space and monitor online health information on the World Wide Web and social networks (45). On the other hand, some studies have highlighted the effective role of libraries on social networks in providing high-quality and reliable information (42, 46, 47), particularly in combating fake news related to Covid-19 (42). During the Covid-19 pandemic, libraries had the opportunity to use social networks to disseminate reliable information and educate their audiences to enhance health literacy and identify high-quality information (48). A stronger presence of libraries, especially hospital and public libraries, on social networks could create a more conducive environment for these libraries to

promote community health literacy and effectively combat the spread of misleading information and fake news (49,50). However, more importantly, Meta should take measures to prevent the spread of information pollution and the proliferation of questionable quality information, especially in the health domain. Implementing regulations regarding the transparency of identity and expertise information of account creators, and policies on content labeling behavior, can be somewhat effective. Additionally, leveraging the experience of X Corp. in crowdsourcing information verification through “community notes” (51) can be highly beneficial. This method allows for the evaluation of post content by other qualified accounts and reflects this evaluation on the post, providing necessary warnings about the post’s credibility and accuracy. It seems that using this method for collective health information verification, especially during pandemics, could be a significant step towards facilitating the assessment of health information quality on social networks.

This study has several limitations that should be considered when interpreting the findings. First, Instagram provides relatively limited search and retrieval functionalities, which may affect the comprehensiveness and reproducibility of data collection. To mitigate this challenge, data retrieval was conducted using the mobile application version of Instagram, which offered greater search capabilities than the web-based interface. Second, the platform’s limited options for systematically storing search results and retrieved posts required the use of supplementary online and offline archiving methods, including screenshot capture and manual cataloging of posts. Although these measures were implemented to ensure data integrity, they may have introduced a degree of operational complexity into the data collection process. Finally, the dynamic and constantly evolving nature of Instagram content represents an inherent limitation of infodemiological research conducted on social media platforms. Posts may be edited, deleted, restricted, or become inaccessible over time, potentially affecting the stability and replicability of the dataset. Consequently, the findings should be interpreted within the temporal context in which the

data were collected.

Conclusion

The study revealed that a significant number of posts under the Persian hashtags “Corona” and “Covid-19” were irrelevant due to improper tagging by content creators, which hinders efficient health information retrieval. To address this problem, Instagram needs to take steps to prevent irrelevant tagging behavior. Additionally, most posts lacked location data and content creator identification, with nearly half failing to mention the creator’s expertise, making it difficult for users to assess information credibility. To mitigate the spread of low-quality health information on Instagram, it is recommended that libraries—particularly public and hospital libraries—collaborate with health systems to monitor or create or publish information. Medical librarians, especially in hospital libraries and public libraries, as key stakeholders in health information management, can play an essential role in evidence-based content evaluation, curation, and dissemination in digital ecosystems. Strengthening their involvement alongside health systems may enhance the quality and reliability of online health information. Furthermore, Instagram should take proactive steps to enhance verification mechanisms and restrict the spread of unreliable health-related content on the platform.

Declaration

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Conflict of Interest

There is no conflict of interest in this study.

Ethical Statement

The current research has been approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran (Ethics Code: IR.SBMU.RETECH.REC.1400.1178).

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None.



Authors' Contribution

Azin Shirishams: Data collection, data analysis, writing the first draft, and final approval.

Azam Shahbdaghi: Project administration and supervision, Study design and methodology, writing - review and revising original draft, preparing and approving the final version of the manuscript for submission.

Saeideh Valizadeh-Haghi: Methodological consultant, review and revising original draft, and

final approval.

Farid Zayeri: Data analysis and final approval.

Reyhaneh Gholamisug: Editing the first draft, citation management, and consistency checking between the Persian and English versions of the manuscript, and final approval.

Use of Artificial Intelligence

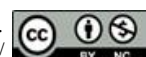
The free version of ChatGPT artificial intelligence was used for English editing.

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