DOI: 10.7860/JCDR/2025/74594.21549

Original Article

Pathology Section

Tweets, Tissues and #Trends: Analysis of Pathology Related Tweets on Social Media

SACHIN SADANAND KALE[1], MAYURI MANGRULKAR[2], RAKESH KUMAR J AJMERA[3], RANJAN AGRAWAL[4], MEERA MAHAJAN[5], S VIJAY SHANKAR[6]

ABSTRACT

Introduction: The social media platform X/Twitter is very active, with participants posting and discussing political topics and other issues. Pathologists have also utilised X/Twitter to share interesting cases and discuss various issues about pathology. However, awareness regarding the use of X/Twitter for pathology education was limited.

Aim: To collect and analyse eight months of pathology-related posts on Twitter/X.

Materials and Methods: This was a retrospective observational study conducted over a duration of eight months, from May 2023 to December 2023, in the Pathology Department of MGM Medical College, Aurangabad, Maharashtra, India. One of the authors, a junior resident in the department of Pathology, manually searched for tweets containing the hashtags #PathTwitter and #PathXterms. Data with full text links were extracted and analysed for the number of cases with images per month. The diagnostic categorisation of cases was done as benign, malignant, or non-neoplastic, and the authors independently validated the diagnoses. An organ-wise analysis of the posted cases was also carried out. The 'Like' count and number of 'Retweets' for each tweet were noted to ascertain the popularity of the topic and its author. Statistical analysis was performed by collecting the data in Microsoft Excel, and the data was presented in the form of bar diagrams, pie charts, etc.

Results: A total of 600 pathology cases were posted on X/Twitter, with an average of 75 cases per month, ranging from a minimum of 38 to a maximum of 136 cases per month. Among these, benign tumours comprised 136 cases, malignant accounted for 277, and non-neoplastic cases numbered 187, as per their given diagnosis. There were 38 haematology-related and six cytology-related non-neoplastic cases. The maximum number of retweets were 398, and the maximum number of likes were 1500, both for a post on eosinophilia. Based on the 'like' count and the number of retweets, the most popular posts were related to haematology, with the most popular author on X/Twitter being Dr Nihar Desai (@nihardesai) in this study.

Conclusion: The social media platform X/Twitter features a rich variety of benign and malignant pathology cases from different parts of the world. Reviewing such cases is useful for students and consultants to enhance their pathology knowledge. Twitter/X can provide networking opportunities, enabling the formation of new connections across countries and continents. It can also lead to career enhancement through academic improvement or networking.

Keywords: Benign, Cytology, Education, Haematology, Malignant, Twitter/X

INTRODUCTION

Social media has democratised the voicing of opinions by common people by providing various free public platforms. Twitter, now called "X," is emerging as a leader in social media alongside other platforms like Facebook, Instagram, and YouTube. A cursory glance at X regarding pathology reveals that many pathologists from all over the world are actively posting interesting cases and discussing various aspects of pathology practice. This can prove to be a great educational resource for students and consultants alike. Many pathologists use #PathTwitter or now #PathX for posting pathology-related content. Hashtags (#) help users find posts related to their areas of interest [1,2]. However, in India, it is observed through casual conversations that not many pathologists are aware of #PathTwitter. This prompted the author to analyse eight months of pathology-related posts, referred to as tweets, and present the findings into various pathology categories, such as benign and malignant lesions, as discussed in the detailed methodology section.

Researchers have been using traditional hospital databases to study or conduct research for decades. Less is known about the use of social media data sources, such as X (Twitter), for research purposes. X/Twitter is a social media platform that allows the rapid exchange of information between people and has the potential to reshape medical practice and pathology [1].

Many practitioners and medical students report a limited understanding and familiarity with X or any social media for educational purposes. The importance of social media in a professional setting is increasingly being acknowledged. X/Twitter has emerged as a powerful tool for communication among professionals and for disseminating medical information to both the medical and non medical public. X/Twitter allows us to connect with millions of people across the globe at any time or place. This has opened many opportunities for fast and effective communication and education [1].

Twitter/X allows users to share up to 280 characters, while premium members can post up to 4000 characters. Tweets can also include pictures, videos, links, and more. The platform supports hashtags, which help users easily find tweets of interest. Additionally, users can create questionnaires or surveys to gather opinions or thoughts from pathologists across the globe [1,2].

As a highly visual specialty, pathology is particularly conducive to this form of communication. An image or case of interest can be easily shared and discussed with experts and users. This becomes easier with the use of specific hashtags, such as #PathTwitter, #PathX, #GIPath, #Uropath, and #Neuropath. These hashtags are used to identify specific terms and facilitate the search and curation of information [2].

Twitter/X is also useful for professional purposes, such as obtaining information on the latest research, following experts and specialists, and learning about new job opportunities. Clinical case discussions also take place on the X platform [2].

To date, there is no descriptive study from India highlighting the pathology-related material available on X/Twitter. Hence, this study was planned with the primary aim of collecting and presenting a summary of eight months of pathology-related posts on Twitter/X. The objectives include categorising cases and discussions by different organ system pathologies and determining if tweets can serve as educational and networking tools for pathologists and students learning pathology. Additionally, the study aims to systematically review the use of Twitter/X in pathology, characterise the current state of Twitter in the field, and describe the pathology-related Twitter network through the analysis of the most commonly used pathology associated hashtags.

MATERIALS AND METHODS

This was a retrospective observational study conducted for eight months, from May 2023 to December 2023, in the Pathology Department at MGM Medical College, Aurangabad, Maharashtra, India, with participation from authors at other medical colleges as well.

Inclusion and Exclusion criteria: This was a web-based study. The inclusion criteria encompassed all pathology-related tweets containing the hashtags #PathTwitter and #PathX. These searches were included because these are commonly used and accepted hashtags for posting and identifying content related to pathology. This approach ensured that only tweets relevant to the subject of pathology were retrieved, while those about other topics were excluded.

A total of 600 tweets containing the hashtags #PathTwitter and #PathX were captured manually. The Twitter platform was searched for these hashtags weekly, and the tweets were retrieved into an Excel file by copying and pasting the links. The parameters extracted included the number of likes, retweets, and the author of each tweet.

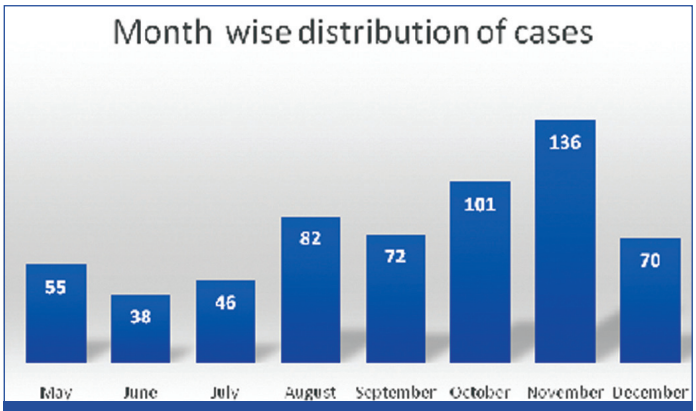
The 'like' count and number of retweets for the tweets were also noted to ascertain the popularity of the topic and its author. The diagnoses of the cases, where available, were analysed and categorised as benign, malignant, or non-neoplastic. These diagnoses were also validated by the authors.

STATISTICAL ANALYSIS

The collected data was entered into Microsoft Excel and analysed. The data was presented in the form of bar diagrams, pie charts, etc.

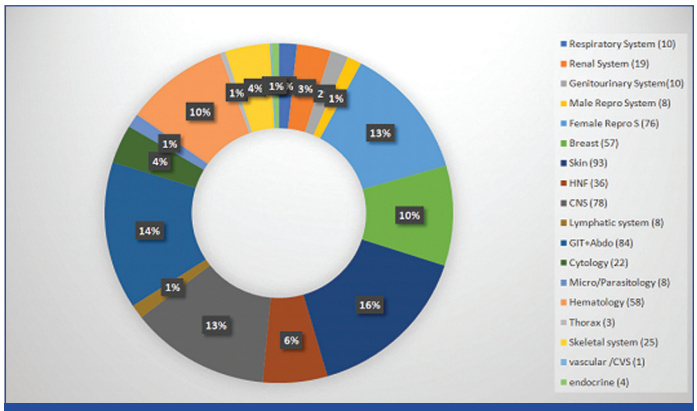
RESULTS

A total of 600 pathology-related original tweets were found during the eight month period. This count excludes replies to original tweets. The month wise distribution is shown in [Table/Fig-1]. November recorded the highest number, with 136 tweets.



[Table/Fig-1]: Month wise distribution of Tweets/Cases in the study.

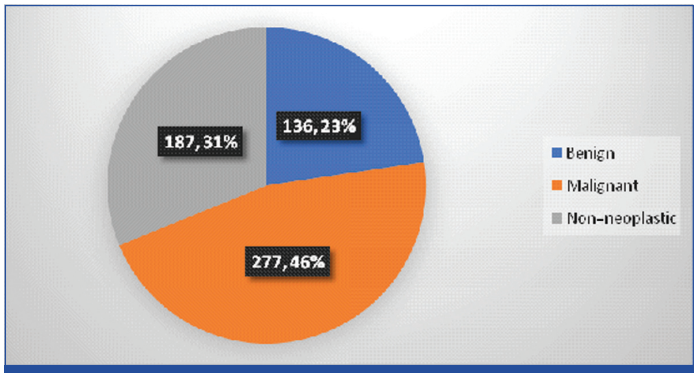
The organ system wise distribution of cases is illustrated in [Table/Fig-2]. Almost all the tweets presented interesting cases in the form of a brief history accompanied by related gross and microscopic photographs, with Immunohistochemistry (IHC) markers included where relevant. Out of the 600 posts, 93 (15.5%) cases were related to dermatology, 84 (14%) cases pertained to the Gastrointestinal Tract (GIT), 78 (13%) were Central Nervous System (CNS) cases, and 76 (12.6%) were from the female reproductive system. An interesting series was posted by a pathologist named Janira Navarro, focusing on these systems.



[Table/Fig-2]: Organ system wise distribution of cases/Tweets.

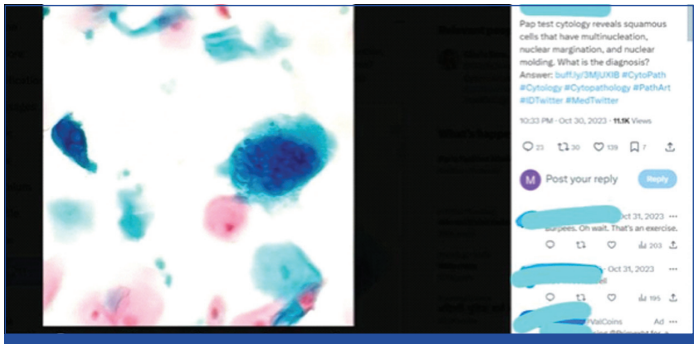
All the cases included three to four photographs. Some users shared a series of tweets discussing a particular topic in a tutorial format and referred to this series as a "Tweetorial." Cases featuring tumours were supported by IHC studies, with photographs attached. This format proved quite popular, as reflected in the high 'like' counts for such tweets.

Diagnoses of the cases, where available, were categorised as benign, malignant, or non-neoplastic. Of these, 277 cases were diagnosed as malignant, 136 as benign, and 187 as non-neoplastic [Table/Fig-3].



[Table/Fig-3]: Classification of Tweets as per diagnostic categories.

One interesting case was posted by renowned cytomolecular pathologist Gloria Sura, MD (@Gloria_SuraMD). The post detailed a PAP test cytology showing the cytopathic effects of HSV infection, including multinucleation, margination, and nuclear moulding [Table/Fig-4].

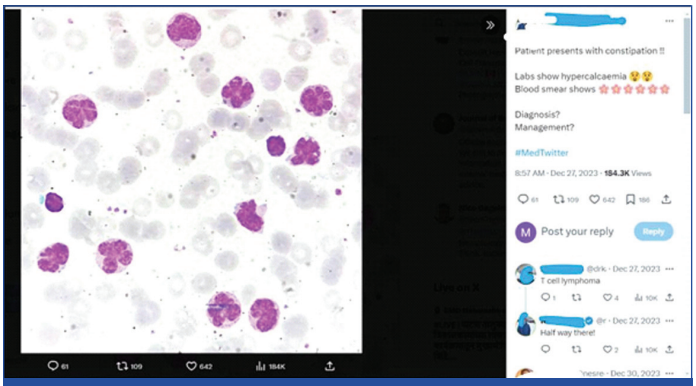


[Table/Fig-4]: Tweet showing cytopathic effects of HSV infection.

The study also analysed the 'like' count of tweets based on their organ system distribution. The organ system with the maximum

likes was hematology, receiving a total of 12,996 likes for the related tweets included in the study. Of these, 1,500 likes were attributed to a single post about eosinophilia, making it the post with the highest likes in this study. The system with the second highest likes was the CNS, which garnered 7,335 likes in total, with one post about psammomatous meningioma receiving 282 likes. The female reproductive system had the third highest number of likes, totaling 3,795, of which 194 were for a single post regarding a sclerosing stromal tumour of the ovary.

Indian onco-haematologist Nihar Desai (@nihardesai7) posted about adult T-cell leukaemia with Human T-cell Lymphotropic Virus type 1 (HTLV-1) infection, which showed cloverleaf nuclei in lymphocytes. This was one of his most popular posts, receiving 642 likes and 100 retweets [Table/Fig-5].



[Table/Fig-5]: Tweet with maximum likes- adult T cell leukemia with HTLV-1 infection showing clover leaf nuclei of lymphocytes.

DISCUSSION

Social media, in general, has become an important part of daily life. It has the potential to overcome geographic boundaries and barriers by connecting and bringing together people from different locations and countries. In the field of education, both educators and students are actively using Twitter/X, as evidenced by the present study.

The present study revealed a wealth of material related to pathology on Twitter/X. People around the world posted interesting cases concerning various organ systems, encompassing both benign and malignant conditions. Pathologists have shown increasing acceptance of professional social media use in recent years. One pathologist, Gardner JM, utilises multiple social media platforms, including X, Facebook, YouTube, and Instagram, for educational and professional purposes [3]. He used X for live tweeting content from pathology meetings and for pathology journal clubs (#pathJC and #dermpathJC), where colleagues from around the world gather to discuss preselected articles from the published literature in real time.

Other studies also support the use of social media in medical education [3,4]. El Hussein S et al., reported that social media platforms like Twitter can be effectively used to advance medical education, disseminate knowledge, and foster interdisciplinary interactions in the field of haematopathology [4]. Similarly, Hans Hamnvag noted that Twitter can be effective in enhancing medical knowledge and networking for medical students during pathology electives [5]. Additionally, a study by Pembe Oltulu highlighted the importance of social media platforms like Facebook and Twitter for pathologists, as they have revolutionised scientific communication, collaboration, and career progression [1]. During this study, an average of 75 cases per month was identified, with a minimum of 38 and a maximum of 136 cases per month. This indicates a significant number of cases that can be studied and discussed on Twitter/X, leading to academic improvements for both pathologists and students. The cases presented a good mix of benign, malignant, and non-neoplastic diagnoses. This diversity can contribute to the overall development of budding pathologists and enhance the experience of senior pathologists. The distribution of cases was almost even across organ systems, with dermatology, GIT, and CNS cases dominating the submissions. This reflects the influence of certain pathologists working in those areas who post cases regularly. This availability allows students and consultants to review cases from different organ systems, with particular emphasis on dermatology, GIT, and CNS, thereby fostering greater expertise in these areas.

Tian R et al., conducted a ten year study on pathology tweets and found that the hashtag #PathTwitter has become popular since 2020. A total of 591,812 tweets were included, with the maximum number of tweets collected in 2020. However, they did not provide a categorisation of cases as benign or malignant [6]. Their study also evaluated the use of hashtags such as #pathology and #Pathtwitter. In the present study, the hashtags #Pathtwitter and #PathX were used to study the tweets. In their study, the organ-wise distribution of tweets/cases with hashtags was as follows: #GUpath (2.1%), #GIpath (2.7%), #Cytopath (2%), #hemepath (2.8%), and #Dermpath (4.4%). The hashtag with the maximum tweets was #Pathology (30.9%), followed by #Pathologist (19.3%) and #PathTwitter (6.9%), with other hashtags accounting for 24%. These findings were not consistent with the present study, which may be attributed to the differing duration of the study period, which was eight months.

One interesting use of Twitter/X is live tweeting at pathology conferences, which involves tweeting what is being discussed at the conferences in real time. This allows the sharing of the latest information and knowledge with users who are not present at the meeting [6]. Additionally, another interesting use is in the form of "Tweetorials." These innovative posts are short teaching narratives that focus on one challenging topic over a sequence of related tweets. They are widely employed for the preparation of pathology exams or certification exams, using hashtags such as #tweetorial [6]. According to Pemmaraju N, Twitter is increasingly utilised in medical practice and scientific research for information sharing, with disease-specific hashtags playing a crucial role in streamlining discussions and connecting users globally, including those interested in rare cancer subtypes. Developing specific and easily identifiable hashtags is essential for enhancing clarity and expanding Twitter's impact [7]. Social media also has the potential to transform cytopathology by enabling global networking, education, patient advocacy, and outstanding patient care [8].

Glassy EF have also stressed the importance of, and potential benefits from, social media and Web 2.0 technologies in the field of pathology, despite its slow adoption by pathologists [9]. Patnayak R et al., have emphasised that pathologists should embrace technology, provide clear information to patients and clinicians, actively engage in patient care, and develop FAQs to empower patients in their healthcare journey [10]. At the same time, Crane GM et al., have highlighted the importance of protecting patient privacy while sharing images on social media [11]. Tushir A et al., conducted a survey that highlighted both the challenges and opportunities of using Twitter as a pedagogical tool. The challenges identified included difficulties in content procurement, technical issues with posting, and social media inertia. However, the opportunities presented by using Twitter included an increase in medical knowledge and opportunities for professional development [12]. Eric Freitgag C et al., argue that social media is a valuable tool for pathologists, which can be used to connect with colleagues around the world, share research, learn about new developments in the field, and promote oneself and one's work [13].

Limitation(s)

The short duration of the study might have missed some pathology-related tweets, as only two hashtags, #PathTwitter and #PathX, were utilised. Further studies, in collaboration with professional IT experts, are advocated to better understand the scope, impact, and trends of pathology on Twitter/X.

CONCLUSION(S)

The social media platform X/Twitter features a rich variety of benign and malignant pathology cases from various parts of the world, covering different organ systems of the body. Numerous cases are posted on Twitter/X, and reviewing these cases can be beneficial for students and consultants looking to enhance their pathology knowledge. The use of X/Twitter for pathology can also be enriching for experienced pathologists who wish to further their education by gaining exposure to disease patterns from different regions around the world.

REFERENCES

[1] Oltulu P, Mannan AASR, Gardner JM. Effective use of Twitter and Facebook in pathology practice. Human Pathology. 2018;73:128-43.
[2] Thompson MA, Majhail NS, Wood WA, Perales MA, Chaboissier M. Social media and the practicing hematologist: Twitter 101 for the Busy Healthcare Provider. Current Hematologic Malignancy Reports [Internet]. 2015 Dec 1 [cited 2022 Jun 30];10(4):405-12. Available from: https://pubmed.ncbi.nlm.nih.gov/26449718/.
[3] Gardner JM, McKee PH. Social media use for pathologists of all ages. Archives of Pathology & Laboratory Medicine. 2019;143(3):282-86.
[4] El Hussein S, Lyapichev KA, Crane GM, Mirza KM, Pemmaraju N, Medeiros LJ, et al. Social media for hematopathologists: Medical practice reinvented—#Hemepath. Current Hematologic Malignancy Reports. 2020;15(5):383-90.
[5] Hamnvåg HM, McHenry A, Ahmed A, Trabzonlu L, Arnold CA, Mirza KM. #Twitterhomework during pathology electives: Transforming pathology pedagogy. Archives of Pathology & Laboratory Medicine [Internet]. 2021 Feb 11 [cited 2025 Feb 2];145(11):1438-47. Available from: https://meridian.allenpress.com/aplm/article/145/11/1438/459602/TwitterHomework-During-Pathology-Electives.
[6] Tian R, Wang E, Priyadharshini Sivasubramaniam, Baskota SU, Sharma A, Cecchini MJ. Ten Years of Pathology on Twitter (X): Landscape and evolution of pathology on twitter From 2012 to 2023. Archives of Pathology & Laboratory Medicine. 2024 Apr 11.
[7] Pemmaraju N, Thompson MA, Qazilbash M. Disease-specific hashtags and the creation of Twitter medical communities in hematology and oncology. Seminars in Hematology. 2017;54(4):189-92.
[8] Lepe M, Gardner JM. Fine social aspiration: Twitter as a voice for cytopathology. Diagnostic Cytopathology. 2017;45(8):705-13.
[9] Glassy EF. The rise of the social pathologist: The importance of social media to pathology. Archives of Pathology & Laboratory Medicine. 2010;134(10):1421-23.
[10] Patnayak R, Jena A, Kumar CA, Rukamangadha N, Phaneendra BV. Pathologists in a net-savvy world. Journal of Pathology Informatics. 2011;2(1):11.
[11] Genevieve M. Crane, MD, PhD and Jerad M. Gardner, mdpathology image-sharing on social media: Recommendations for protecting privacy while motivating education. AMA Journal of Ethics. 2016;18(8):817-25.
[12] Tushir A, Duy Nguyen T, Biehl C, Mirza KM. Challenges and opportunities in using twitter as a pedagogical tool in pathology and laboratory medicine education. Am J Clin Pathol. 2022;157(6):836-43.
[13] Freitag CE, Arnold MA, Gardner JM, Arnold CA. If you are not on social media, here's what you're missing! #dothething. Archives of Pathology & Laboratory Medicine. 2017;141(11):1567-76.

PARTICULARS OF CONTRIBUTORS:

1. Professor, Department of Pathology, MGM Medical College, Aurangabad, Maharashtra, India.
2. Resident, Department of Pathology, MGM Medical College, Aurangabad, Maharashtra, India.
3. Assistant Professor, Department of Pathology, Government Cancer Hospital, Aurangabad, Maharashtra, India.
4. Professor, Department of Pathology, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India.
5. Associate Professor, Department of Pathology, MGM Medical College, Aurangabad, Maharashtra, India.
6. Professor, Department of Pathology, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, Bengaluru, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Sachin Sadanand Kale,
31, Mitra Nagar, Behind Akashwani, Aurangabad, Maharashtra, India.
E-mail: drss.kale@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Aug 14, 2024
- Manual Googling: May 03, 2025
- iThenticate Software: May 06, 2025 (3%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? NA
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Aug 10, 2024**
Date of Peer Review: **Nov 05, 2024**
Date of Acceptance: **May 08, 2025**
Date of Publishing: **Sep 01, 2025**