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Monkeypox Outbreak Reflecting Rising Search Trend and Concern in Nonendemic Countries: A Google Trend Analysis

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Monkeypox virus (MPXV), a double-stranded DNA virus from the genus *Orthopoxvirus*, causes a re-emerging zoonotic disease named monkeypox (MPX).[1] The first human MPX case was detected in the Democratic Republic of the Congo (DRC) in 1970.[2] Furthermore, this zoonotic infection has spread and become endemic to Africa (especially Central and West). The first MPXV-infected cases were formally reported in 2003 in the United States of America; furthermore, recent MPXV-infected cases have been diagnosed in nonendemic countries until 2022.[2,3] Various animal species such as rope squirrels, tree squirrels, elephant shrews, dormice, Gambian pouched rats, nonhuman primates, etc., can be infected by MPXV. However, the primary reservoirs of MPXV remain ambiguous.[2] The MPXV transmission to humans occurs when direct or indirect contact with infected humans, suspected animals, and contaminated materials takes place.[3]

Centrifugal distribution of skin lesions (a rash that advances from popular, macular, pustular, vesicular, and lesions to crusts) and gastrointestinal and respiratory signs are expected in MPX-infected cases. Furthermore, septicemia, bronchopneumonia, encephalitis, and ocular lesions have been reported in severe cases.[2] The smallpox vaccination with the vaccinia virus had cross-protection (nearly 85%) against MPX.[4] The limited vaccination programs against smallpox and other *Orthopoxvirus* are carried out in selected groups such as military populations and high-containment laboratory staff; however, large-scale vaccination programs against any *Orthopoxvirus* in the general population were no longer indicated after smallpox eradication in 1980.[5]

Infodemiology, especially search interest analysis and Web mining, has become attractive research topics since 2020, especially during the COVID-19 pandemic.[6,7] Most of the Internet users choose Google as a search engine.[7–9] Therefore, Google Trends (GT) was launched for visualizes and analyze the search interest of queries in various languages and regions. Moreover, search interest is demonstrated by the Relative Search Volume (RSV) index with the 0 (absence of popularity) to 100 (highest popularity) range in GT based on all searches of everything performed during the selected period.[7–10] The benefits of search trend analysis in medical research are surveillance and prediction of disease outbreaks.[8,9] This analysis aims to emphasize confirmed and suspected cases of MPX based on the WHO report and its reflection on people's search trends from May 13 to May 21, 2022, in nonendemic countries.

Methods

During this analysis period, the range of 72 to 140 confirmed cases and 19 to 40 suspected MPX cases were identified during this analysis period based on the WHO report in non-endemic countries.[3] The nonendemic countries in this observation were as follows: Australia, Belgium, Canada, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom (UK), and United States (Table 1).

Popular interest in the disease outbreak may have been reflected in different communities' search trends on Google.[8] Therefore, 2 topics, "Monkeypox" and "Monkeypox virus," were searched in GT for gathering data from May 13 to May 21, 2022, in investigated countries. In GT, the search term is a specific result that only includes RSV of matches for all terms in your query in a language given. However, the advantage of topic search is considering the group of search terms that share the same concept or entity, in any language.[7–9]

Results

The RSV waves of the GT have been raised over the analysis duration (May 13-21). Therefore, increased search interest implicitly displayed the communities' attention to this zoonosis outbreak. The first confirmed MPX cases were reported in the United Kingdom from May 12 to 13[3]; therefore, a mild increase in this country's RSV trend was observed on May 14, 2022.

Table 1. WHO monkeypox statistics (May 13-21, 2022)[3]

Country	Number of cases	
	Confirmed	Suspected
Australia	1-5	–
Belgium	1-5	1-5
Canada	1-5	11-20
France	1-5	1-5
Germany	1-5	–
Italy	1-5	–
Netherlands	1-5	–
Portugal	21-30	–
Spain	21-30	6-10
Sweden	1-5	–
UK	21-30	–
USA	1-5	–
Total	72-135	19-40

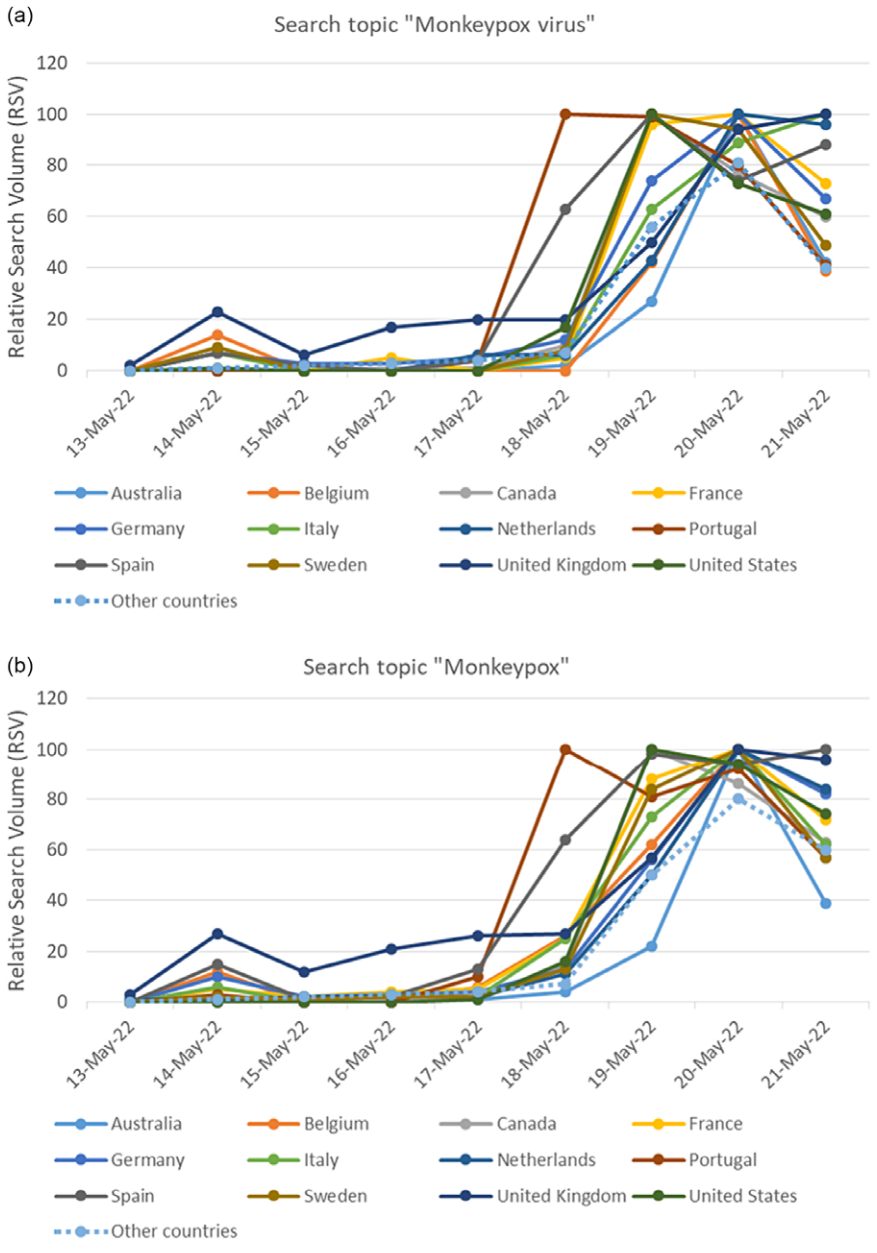


Figure 1. Google Trend of 2 topics, "Monkeypox virus" (A) and "Monkeypox" (B), in non-endemic and other non-affected countries.

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Furthermore, in Portugal and Spain, a sharp rise in RSV trend was observed earlier than in other countries on May 18, 2022, which could be due to the reporting first suspected and confirmed MPX cases in these 2 countries from May 17-18, 2022.[3] Likewise, other nonendemic countries had a similar RSV trend pattern from May 18-20, 2022, due to reporting either first or new suspected and confirmed MPX cases (Figure 1).[3] Therefore, there has been an association between the incidence of MPX cases and search interest about this disease on Google.

Discussion

A similar study showed the positive correlation between the increasing coronavirus disease 2019 (COVID-19) cases and rising Google search interest and concerns in the United States, United Kingdom, Italy, Spain, France, China, India, and Iran; therefore, this study mentioned that the potential of the Google search trend analysis to find the prevalence of psychological impacts following COVID-19 in the specific region.[8]

In the disease outbreak, the analysis of search interest in GT may determine the most and least infected areas of specific communities. Furthermore, the semantic analysis of search trend data about the disease outbreak, such as the MPX outbreak, may be valuable to find the spread of the community's interest in the specific region; accordingly, it can be considered as an avenue with the high-impact potential to help future psychological studies (cognitive and behavior) and bring awareness to health policy-makers for public health planning and preparedness in epidemics and pandemics. The importance of risk communication is evident in communities with raised GT search interest about outbreaks for the rapid dissemination of accurate and preventive information to reduce public concern about MPX outbreaks and instructions on how to change behavior to mitigate those risks.

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Conflict of interest. The authors have no conflicts of interest to declare.

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