



Comment on “Seasonal variations of Google searches for joint swelling: implications for patient-reported outcomes”

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I read with great interest the research letter by Zhao et al. [1]. The authors raised an important point about the term searched in my study [2]. I would like to discuss why I chose the disease itself (i.e., gout) rather than its symptoms as a searched term in the study [2]. Also, I would like to highlight two issues that seem to be not taken into account in Zhao et al.’s research [1].

While I agree with the statement that “... individuals with an acute monoarthritis are far more likely to report to their doctor with (or search online for) ‘I have a painful, swollen toe’, rather than ‘I have gout’ ...” [1] for the individuals who have not yet been diagnosed with gout by a physician; I believe the speculation of “while a lay impression or suspicion of gout may not be an acceptable definition to infer seasonality of gout incidence, Google search data for joint swelling—a symptom of many rheumatic diseases—is of major clinical significance” [1] needs to be discussed. I acknowledge that the symptom rather than the disease might provide more valid and comprehensive representation of people with a disease who sought online information in some health-conditions (e.g., bruxism) [3], as this assumption was corroborated by the observation that the symptom (i.e., teeth grinding) had a ≈ 2 -fold higher relative search volume than the disease itself (i.e., bruxism) [3]. As I noted in my study, “The term gout was chosen because it was reasoned that this term would capture more people with gout who have looked for information via the Internet”, and “This assumption was corroborated by the

observation that [gout] had a ≈ 25 -fold higher relative search volume than other terms (e.g., gouty)” [2]. This is also the case for its symptoms (i.e., swollen big toe/big toe pain) (based on Google Trends; data not shown). Furthermore, when top-related queries for the gout symptoms are scrutinized to gain insights what other queries were searched by the users who searched the above symptoms, it is observed that these symptoms were not only searched for obtaining information on gout but on other rheumatic conditions (e.g., bunion) and non-rheumatic conditions (e.g., broken big toe, ingrown toenail, and turf toe) as well (based on Google Trends). Therefore, it is not possible to attribute all search queries of symptoms (i.e., swollen big toe/big toe pain) to gout in particular or rheumatic diseases in general. On the other hand, some readers may speculate that the patients diagnosed with gout by physicians may search online gout information, rather than the patients who diagnose themselves. Moreover, as the gout is a chronic disease, the patients with gout may search online gout information when the disease flares-up. However, I believe that these speculations and Zhao et al.’s speculation as well [1] may also not be correct and need to be investigated by further studies.

I would like to emphasize two important points that should be considered in analyses/interpretation of seasonality using Google data: (1) The seasonal variation should be tested to determine whether it is a statistically significant (e.g., with season package [4]); (2) The countries from both hemispheres should be included to assess seasonality as it is expected to be out of phase by 6 months between these hemispheres [5]. It seems that Zhao et al.’s research [1] did not take the above points into account.

In conclusion, I strongly believe that the discussion on use/analysis/interpretation of Internet data in health should be expanded and deepened. Therefore, I thank Zhao et al. for raising this important point to discuss.

See related article <https://doi.org/10.1007/s10067-019-04630-1>

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Compliance with ethical standards

Disclosures None.

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