

Peer Review

Review of: "Google Trends in the Diagnosis of Meteosensitivity"

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This is an interesting study, which can broaden the range of atmospheric factors considered triggers of headache disorders and therefore, provide insights into disease pathophysiology. The manuscript is well-written, with a few minor amendments needed. However, an important issue concerning applied methodology could affect the obtained results and should be addressed by the authors. Please find my recommendations below:

1. The most important problem is the selected study period. Data regarding relative search volumes and the planetary index were collected for the years 2019–2023. As we know, Google Trends data are extremely sensitive to events affecting people's interest or receiving high media coverage, and such events should be omitted as they interfere with study results. I believe a similar issue could be observed in your study. A significant decrease in searches happened around February of 2022 (Fig.1), which I believe is attributed to the Russian invasion of Ukraine. A diminished search for the headache term probably resulted not from a decreased incidence of headaches but because people in threat likely did not search for these terms. The decrease in migraine searching is not so apparent – might it be due to initially low relative search volumes? On the other hand, after this date, the planetary index increased noticeably. Reasons for such a clear increase should be specified to avoid mistakes in period selection. Might it be the starting solar cycle increasing to the solar maximum in this period? A proper observation period is crucial in these kinds of studies. Hypothetically, opposite findings could be reported if the increasing planetary index (e.g., attributed to the starting solar cycle) meets a long-term rise in search volumes (which has been reported for headache – DOI: [10.1177/0333102416681572](https://doi.org/10.1177/0333102416681572)). Therefore, I strongly recommend changing and/or lengthening the study period. Perhaps a few different periods should be combined to avoid these long-term effects on correlation analysis?

2. Data were collected in weekly intervals, which might not necessarily reflect dynamic changes in the planetary index (often reported in 3-hour intervals). In such a weekly observation, the effect of a sudden increase in geomagnetic activity on weekly headache occurrence might be missed. I recommend using daily intervals of Google Trends data. This requires selecting a shorter query period, while it is crucial to compare different periods in one query (using the comparison option) because data from different queries are relative and not comparable to each other.
3. Please specify if you used search topics or search terms (in this case, which language was used). You can use the standardized report framework for reporting your Google Trends search ([DOI: 10.2196/13439](https://doi.org/10.2196/13439)).
4. The manuscript reads really well, but it could use some adjustments. First, the introduction of studies covering the link between atmospheric factors and human health is interesting and, for sure, needed, but I recommend providing better text structure. I also miss the discussion section, which I believe could be useful for describing potential pathophysiological mechanisms of geomagnetic activity on headache initiation and propagation. Some information from the introduction may be transferred there (especially the description of how geomagnetic activity might affect headaches). A variety of different atmospheric factors have been described to have an impact on headaches, and it could be interesting to read how they relate to geomagnetic activity. Moreover, seasonal chronobiological patterns of primary headache disorders have been described, also using Google Trends methodology ([DOI: 10.1111/head.14444](https://doi.org/10.1111/head.14444); [DOI: 10.1111/head.14329](https://doi.org/10.1111/head.14329)), so it could be useful to compare your findings and describe how geomagnetic activity may contribute to those seasonal cycles.

As a conclusion, this is a very good idea, and your approach is nicely described. It requires a certain change in methodology before publication (study period and/or data intervals), but the Google Trends tool enables it easily. Good work!

Declarations

Potential competing interests: No potential competing interests to declare.