



Brief Communication

Why do people Google epilepsy? An infodemiological study of online behavior for epilepsy-related search terms



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ABSTRACT

Millions of people worldwide use the Internet daily as a source of health information. Google is the most popular search engine and is used by patients and physicians to search for online health-related information. This study aimed to evaluate changes in web search behavior occurring in English-speaking countries over time for terms related to epilepsy and epileptic seizures. Using Google Trends, data on global search queries for the terms “epilepsy”, “seizure”, and “seizures” between January 2004 and September 2013 were analyzed. The reduction over time in search queries for the term “epilepsy” (and, to a lesser extent, “seizures”) was counterbalanced by an increased trend in searches for the term “seizure”. Most terms associated with the search queries were related to symptoms of seizures, especially tonic–clonic seizures, and to seizures occurring in children. Three peaks in search volume over the period studied corresponded to news of celebrities having seizures. The volume of searches for the term “epilepsy SUDEP” was found to be enormously increased over time. Most people appear to use search engines to look for terms related to epilepsy to obtain information on seizure symptoms, possibly to aid initial self-diagnosis. Fears and worries about epileptic seizures and news on celebrities with epilepsy seem to be major factors that influence online search behavior.

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1. Introduction

Every day, millions of people worldwide use the Internet as a source of health information. The increasing number of online searches conducted using popular web search engines such as Google generates trend data that can be analyzed over time to detect regional outbreaks of diseases. In this way, such metadata can act as a real-time surveillance method to complement more traditional ones [1]. A new research discipline termed “infodemiology”, which is the study of the determinants and distribution of health information, has, therefore, emerged [2].

Google is the most popular search engine and is likely to be used by patients and physicians to look for online health-related information. Trend data generated by the number of Google searches over time can be analyzed by Google Trends, an online tool which allows users to graph the frequency of searches for single or multiple terms [3–5]. The obtained graphs are normalized on a relative basis and can focus on specific time intervals or geographic regions [4,5].

The aim of this study was to evaluate and interpret changes over time of web search queries for terms related to epilepsy and epileptic seizures in English-speaking countries.

2. Methods

The keywords “epilepsy”, “seizure”, “seizures”, and “SUDEP” (sudden unexplained death in epilepsy) were entered in the “Google Trends” main page (available at: <http://www.google.com/trends>, accessed 13th September 2013). The relative normalized search volume numbers were analyzed to assess changes in interest in these search terms over time [3]. All the results returned by Google Trends are normalized, with sets of data divided by a common variable to cancel out the variable's effect on the data, and presented on a scale from 0 to 100. Doing so allows the underlying characteristics of the data sets to be compared; if this normalization was not performed and absolute rankings were used, data from regions generating the largest search volume would always be ranked highly. The numbers on the graphs obtained by such an analysis reflect how many searches have been performed for a particular term, relative to the total number of searches performed using Google over time. Each point on the graph is divided by the highest point, which is conventionally set at 100.

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We also analyzed search volume numbers over time reported as a percentage of growth by applying the “health” category filter [3]. The obtained graphs show changes over time as a percentage of growth with respect to the first date on the graph (or the first date that has data). Consequently, the values on the y-axis of the category comparison graph range between -100% and $+100\%$, assuming a starting point of 0.

We descriptively analyzed the changes over time of web search queries and evaluated possible correlations with news headlines also reported in Google Trends. Furthermore, we evaluated the search volume by country by analyzing reported search volumes relative to the highest point, conventionally set at 100 [3].

Finally, we aimed to compare the number of search results returned by Google for the terms related to “seizure/epilepsy” and “SUDEP”. We entered the set of keywords “seizure”, “seizures”, “epilepsy”, and “SUDEP” at the “Googleflight” main page (available at: <http://www.googleflight.com/>, accessed 12.11.13). Googleflight is a website that allows users to compare the number of search results returned by Google for two competing queries [6].

3. Results

3.1. Search trends for the term “epilepsy”

A progressive reduction in search volume numbers over time was observed for the term “epilepsy”. The highest relative normalized search volume number (100/100) was apparently close to the very start of the time line (February 2004). By September 2013, a reduction of 57% was observed compared with January 2004, after applying the “health” category filter (Fig. 1).

The search volume for some terms was found to increase over time: “signs of epilepsy” (+140%), “cause of epilepsy” (+110%), “epilepsy symptoms” (+90%), “what causes epilepsy” (+70%), “epilepsy definition” (+50%), “epilepsy in children” (+50%), and “epilepsy medication” (+50%).

The greatest search volume for the term “epilepsy” was in South Africa (100/100), followed by the United Kingdom (99/100), Kenya (88/100), Australia (87/100), Ireland (78/100), Ghana (74/100), and Nepal (69/100).

3.2. Search trends for the term “seizure(s)”

More stable search volume numbers were observed for the terms “seizure” and “seizures”, with the highest relative normalized search volume numbers observed in January 2009 (“seizures”: 53/100) and March 2013 (“seizure”: 84/100). After applying the “health” category filter, we observed an increase of 6% for the term “seizure” and a reduction of -25% for the term “seizures”, compared with January 2004.

These peaks in search volume numbers corresponded with news of “[John] Travolta’s son died of seizures”, “Jett [John Travolta’s son] had history of seizures” (January 2009), and “[the rapper] Lil Wayne recovering in hospital after a seizure” (March 2013). An additional (but smaller) peak in search volume numbers for the term “seizure” (relative normalized search number 63/100) occurred in August 2013, which corresponded to the news “[the American singer] Chris Brown suffers seizure”.

The greatest search volume for the term “seizure” was reported in the United States (100/100), followed by the Philippines (63/100), Canada (60/100), Jamaica (58/100), Australia (38/100), Ireland (38/100), and Singapore (35/100). In contrast, the greatest volume for the search term “seizures” was reported to have occurred in the United States (100/100), followed by Jamaica (69/100), Canada (55/100), Kenya (45/100), New Zealand (37/100), Australia (37/100), and South Africa (35/100).

The search volume for some terms specifically related to the keyword “seizure” was found to be increased over time: “having a seizure” (+600%), “seizure symptoms” (+120%), “what is a seizure” (+110%), “febrile seizure” (+90%), “seizure causes” (+90%), “symptoms of seizure” (+80%), “clonic seizure” (+60%), “grand mal” (+60%), “tonic” (+60%), and “tonic seizure” (+60%). Terms specifically related to the keyword “seizure” and whose search volume was found to be increased over time were as follows: “what causes seizures” (+250%), “seizures in children” (+190%), “what are seizures” (+150%), “absence” (+110%), “seizures symptoms” (+110%), “absence seizures” (+100%), “seizures causes” (+100%), “seizures in dogs” (+100%), “children seizures” (+90%), and “dog seizures” (+60%).

3.3. Web search results for the terms “seizure(s)”, “epilepsy”, and “SUDEP”

The terms “seizure(s)” and “epilepsy” got a much higher number of results on Google (seizure: 3,230,000; seizures: 2,820,000; and epilepsy: 2,750,000) compared with the term “SUDEP” (20,900). An increase in search volume numbers over time was observed for the term “SUDEP”. The greatest search volume for the term “seizure” was reported in India (100/100) followed by the United Kingdom (68/100) and United States (25/100). The term SUDEP was found to be specifically related to epilepsy, and the search volume for the term “epilepsy SUDEP” was found to be enormously increased over time (+5000%).

4. Discussion

This study represents the first attempt to evaluate changes in web search behavior for terms related to epilepsy and seizures. We found that there was a reduction in tendency to search for the term “epilepsy” (and, to a lesser extent, “seizures”), which was counterbalanced by an increased trend to search for the term “seizure”. Most terms that people also used that were associated with the search queries for seizure(s)

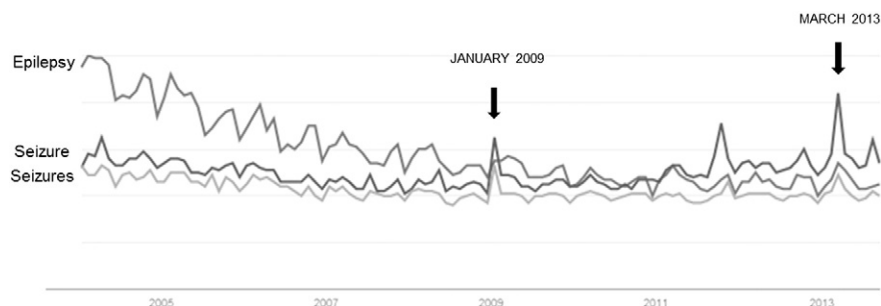


Fig. 1. Google Trends graph depicting tendency over time of Internet search queries for the terms “epilepsy”, “seizure”, and “seizures” worldwide from January 2004 to September 2013. Results are expressed as relative normalized search volume numbers.

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