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ORIGINAL ARTICLE

Google trends in "anatomy": pre-pandemic versus during COVID-19 pandemic

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Abstract

Purpose The purpose of the present study was to assess the online search behavior for the keyword "anatomy" worldwide and to compare the pre-pandemic and during COVID-19 pandemic scenario for the same.

Methods Google trends tool was used for the assessment of the search behavior for the term "anatomy". The data, i.e. relative search volume (RSV) were downloaded for this term using the all categories, web search and only YouTube settings during a period from 1.1.2019 to 3.31.2021 from www.trends.google.com. The geographic trends for this search query were plotted across the world.

Results Seasonal peaks were observed for the search term "anatomy" during the first 3 months of the year and in months of September, October and November in 2019. Similar seasonal peaks were observed for the year 2020 except that there was sudden decrease in RSV for term "anatomy" in the month of March. Though trend for the rest of the year was same, but there was general lower RSV in 2020. The country with highest search hit was United States followed by Canada, Ireland, Australia and Philippines.

Conclusion The search trend for pre-pandemic and pandemic period was similar with overall lower RSV during 2020, where it noticeably decreased during the initial phase of lockdown, i.e. in the month of March. As the whole world is still in the COVID-19 pandemic era, the future studies may report the google trends once the pandemic is over and may compare the post-pandemic trend for the same.

Keywords Anatomy · COVID-19 · Google trends · Relative search volume · Worldwide · Pandemic

Introduction

Anatomy is the foundation of medical education and cadaveric dissection is considered the ''gold standard'' in the subject [4, 10, 20]. After the declaration of COVID-19 as pandemic by WHO in March 2020, all the educational institutes including medical were shut down worldwide. The anatomy education was delivered virtually and the anatomy learners were ensued away from the dissection labs [15]. The authors aim to study the online interest for google search term "anatomy" worldwide during pre-pandemic and pandemic times.

As of February 21, 2021, Google is the most popular search engine in worldwide with a market share of 86.6% [11]. Google has been graded the most suitable platform for biomedical queries by medical students [9]. The Google Trends application is a freely available resource by Google which allows users to generate a graphical, spatial and temporal representation of search interest for specific keywords or phrases (www.trends.google.com). Search interest or relative search volume (RSV) is calculated by dividing the number of searches for the chosen keyword by the total number of google searches for all queries during a defined time period [14]. The present study was proposed to assess the interest in search term "anatomy" during pandemic COVID-19 and pre-pandemic year (2019) using novel, publicly available google trends tool. The purpose was to ascertain if virtual Anatomy teaching and learning of the subject during COVID-19 pandemic affected the trend for the search term "anatomy" (for web search and you tube only) and to compare it with pre-pandemic data. The authors also intend

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to study the seasonal peaks and the possible reasons for the same.

Materials and Methods

We performed Google Trends search in April (first week) 2021 to observe trends in the internet searches for the word "Anatomy". The term was inputted and searched using the "all categories, web search and only you tube" setting during a definite time period from 1.1.2019 to 3.31.2021 on www.trends.google.com. The worldwide was selected as the region for all the searches. Geographic trends for the search query "Anatomy" were plotted across the world.

Data analysis

The data were downloaded from Google Trends for the search term "anatomy", recorded weekly and converted to monthly. The graphic analysis was performed using Microsoft excel. The correlation of monthly RSV was calculated between the year 2019, 2020 and 2021 (3 months) using Pearson's correlation coefficient.

Results

Seasonal peaks for the search term "anatomy" during the months of January, February and March followed by decline till August, again increased trend for next 3 months i.e. September, October, November shadowed by drop in December, 2019 were observed (Fig. 1). The identical seasonal peaks were noticed for the year 2020 except that there was sudden decrease in RSV for this term in the month of March. The trend for the rest of the year was similar to the year 2019 and there was lower average RSV for the year 2020. There was very good correlation of RSV for the years 2019 and 2020 ($r=0.89$; $p=0.38$). Seasonal peaks in the first 3 months of the year 2021 were also observed with highest RSV in the month of February. The correlation value (r) between the first 3 months of the years 2020 and 2021 was 0.67 ($p=0.51$).

While searching google trend for the term "anatomy" for you tube, almost similar seasonal peaks as in web search were recorded. For you tube "anatomy" search, RSV increased in the first 3 months of the year, declined in the following months and again increased for the months of August to November and dropped in December for 2019; similar trend was noticed for the year 2020 except that it declined from March to July 2020 (Fig. 2). Nearly similar RSV was observed for first 3 months of 2021, with highest in February. Very good correlation was observed for RSV for the year 2019 and 2020 ($r=0.93$; $p=0.36$) and for 2020 and 2021 first 3 months ($r=0.93$; $p=0.4$).

Popularity for search term "anatomy" by country

The top five countries with highest search hit for Anatomy web were United States followed by Canada, Ireland, Australia and Philippines and for "You tube" search for Anatomy

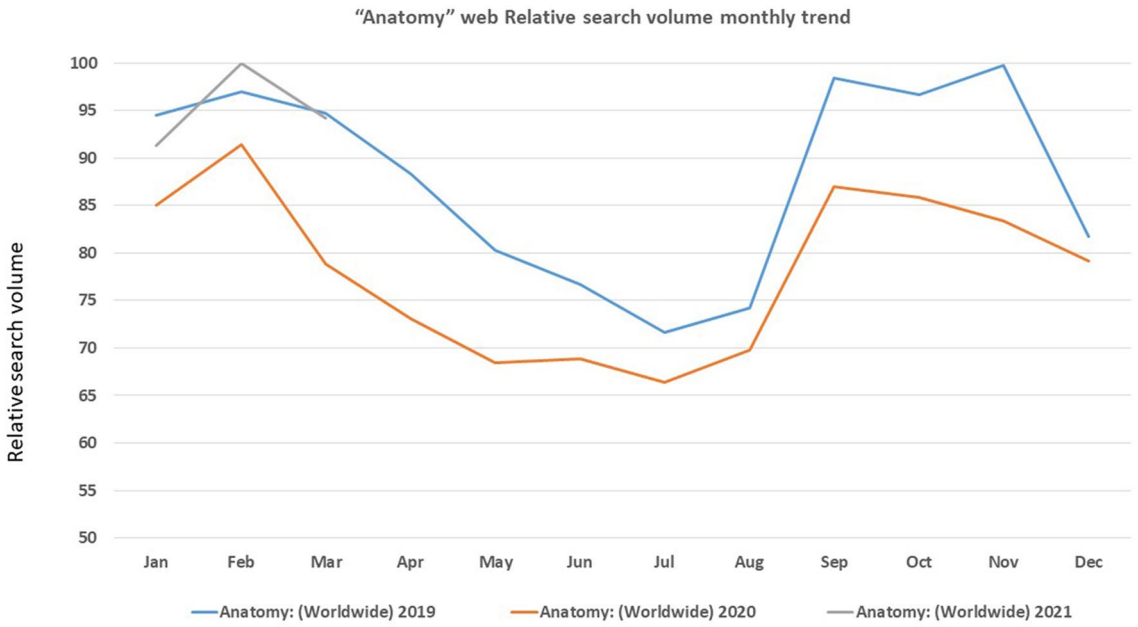

Fig. 1 RSV of keyword "anatomy" worldwide (web) from 1.1.2019 to 3.31.2021

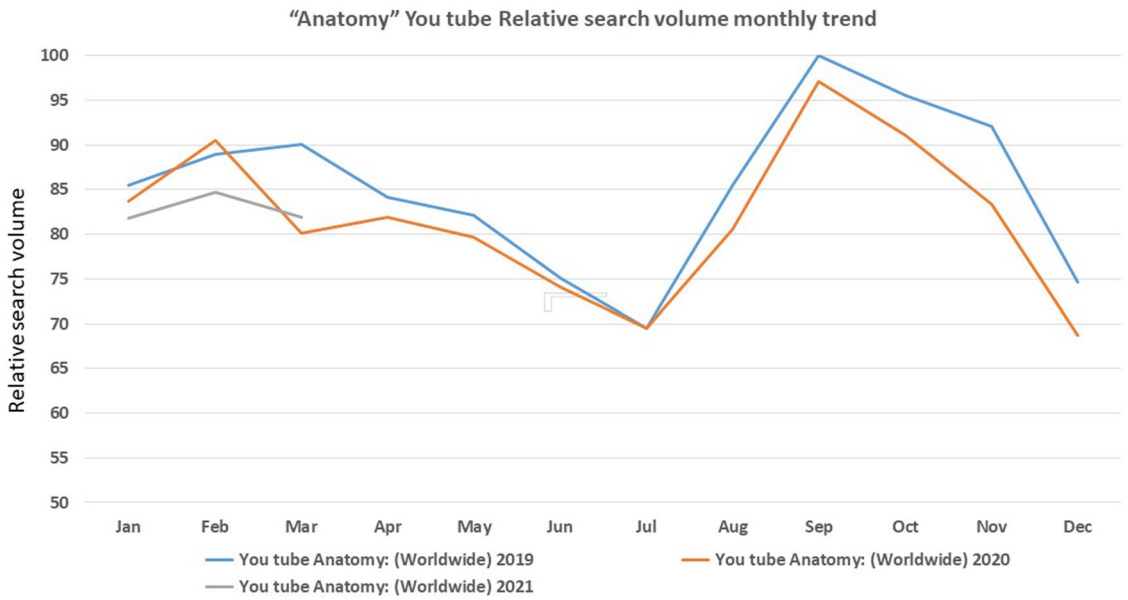

Fig. 2 RSV of keyword "anatomy" worldwide (you tube) from 1.1.2019 to 3.31.2021

were Ethiopia, Ireland, Ghana, Trinidad & Tobago and South Africa (Figs. 3, 4).

Discussion

Google Trends data have been previously utilized to gather insights into the online learning activities in Anatomy and is supposed to be useful in designing the online supports for Anatomy learners [14]. In the present study, Google trends tool was used for analyzing the search behavior for the word "anatomy" worldwide and to compare the pre-pandemic and during COVID-19 pandemic search behavior for this term.

While comparing the trend graph of the search term "anatomy" for the year 2019 and 2020, 2021 (first 3 months) i.e. the pre-pandemic and during pandemic time, the similar seasonal peaks were reported except that there was sudden drop in RSV for this term in the month of March in 2020. This was the month (11th March 2020) when COVID-19 outbreak was declared as pandemic by the World Health Organization [19]. The worldwide lockdowns were announced in this month, all the educational institutes including medical colleges were temporarily closed to contain the spread of COVID-19 [8, 16]. Anatomy education switched to the digital platform globally with least delays. This scenario imposed unexpected disruption to anatomy education as the learners lost access to cadaver [13, 15, 17]. Though there is already restriction on the cadaver dissection practice in several medical institutes because of various ethical and cost issues e.g. in Italy [3, 7], however, during this pandemic, the students lost access not only to cadaver, but other learning modalities too. The authors consider that

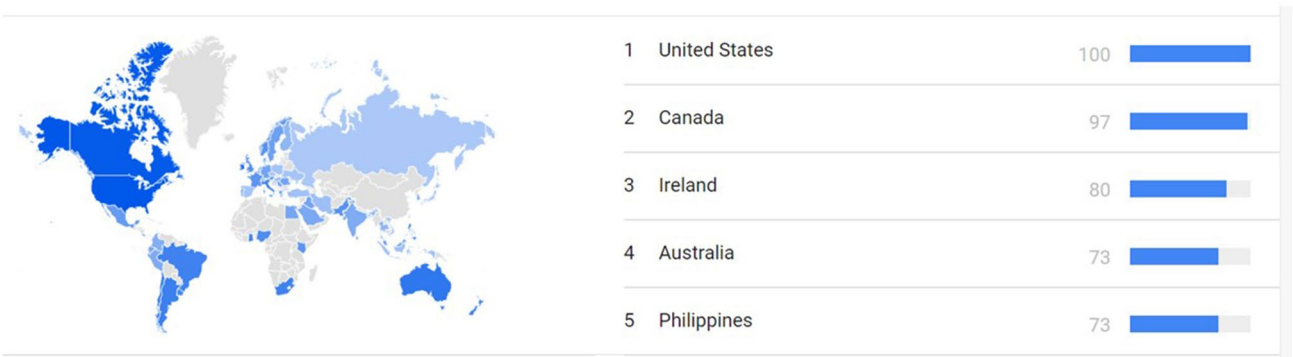

Fig. 3 Geographic trend in the search term "anatomy" worldwide (web) from 1.1.2019 to 3.31.2021

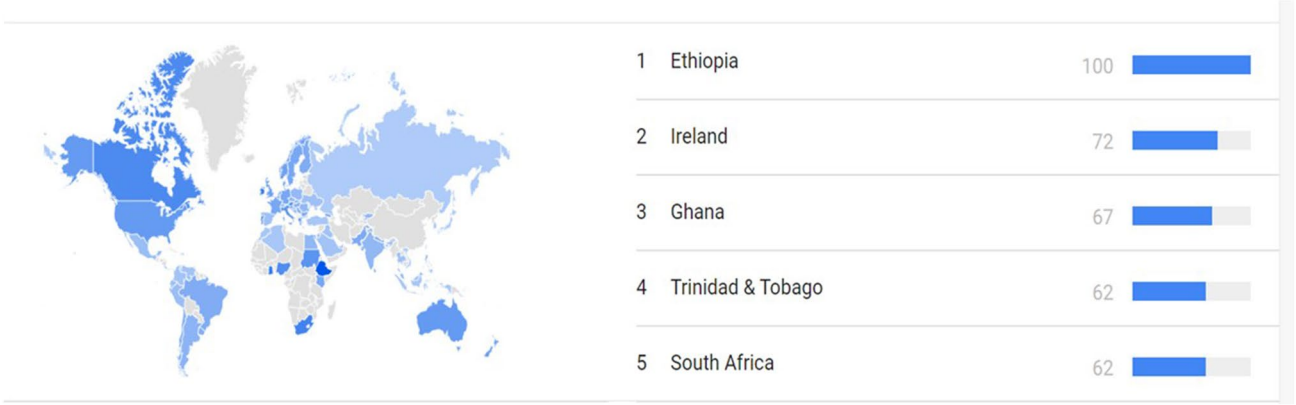

Fig. 4 Geographic trend in the search term "anatomy" worldwide (you tube) from 1.1.2019 to 3.31.2021

dissection gives the full impression of texture, size and three-dimensional relationship of different anatomical structures and the hands-on experience gained in dissection hall is matchless, especially for future surgeons.

The students learned Anatomy during pandemic especially during lockdown period either from virtual anatomy classes or from textbooks. Some used google platform for their anatomy education or related queries. There was very good correlation of RSV in the google trends of search term "anatomy" for the years 2019 and 2020 and the average RSV was statistically lower ($p = 0.02$) in the year 2020 for the web search. The probable reasons which might decrease the overall interest for google search in the year 2020 may be: (1) increased screen time for virtual classes (2) links shared by anatomy faculty to their students (3) impacted research in Anatomy because of the closure of labs, dissection halls and no acceptance of body donations. The lower RSV in YouTube for this keyword may be primarily because of no dissections being performed by the students during lockdown period or university closures. As in the last quarter of the year 2020, some of the medical institutes and universities started opening, anatomy education started gaining momentum in initial months of the present year (2021), as indicated by seasonal peaks for the first 3 months in year 2021 with highest RSV in the month of February.

The decline in the subsequent months till August was noticed, followed by seasonal peaks in the months of September, October and November (year 2019, 2020). This is the time when new semester or session starts in most of the medical institutes. During pre-pandemic period, these seasonal peaks may indicate that students may have performed online searches in the initial learning phase of the subject or when forming study notes, which are regarded as the most valuable resource for self-directed learning [2]. During pandemic, this increase in RSV may be because the medical schools started opening as lockdowns were over in most of the countries and some were planning for the final exams during these months, which were delayed because of the pandemic COVID-19. A decline in RSV in the month of December may be because of the vacation time in this month in many set-ups.

Popularity for search term "anatomy" by country

The top five countries with highest search hit for Anatomy web were United States followed by Canada, Ireland, Australia and Philippines. It is significant to mention that in the current study the google search trend for keyword "anatomy" was searched; however, region-specific language-variant like "anatomi" the Nordic word may significantly affect the geographic popularity of the term [12]. Also, the internet access and its use are correlated with the wealth and education level of a country. In some countries, the government controls the search engines, which could influence the full spectrum of searches across a region [1, 6].

It is acknowledged that searches on "anatomy" may be performed by users from different medical streams like medicine, dentistry, veterinary, physiotherapy, nursing, and allied healthcare sciences. Some searches may be performed by other cohorts of anatomy-related users including the wider community in the context of some disease, health concerns or curiosity [5, 14, 18]. However, the authors consider that this factor may not influence the pre-pandemic- and pandemic-phase comparison of RSV, as this effect will be there at any given time.

In conclusion, the search trend for pre-pandemic and pandemic period was similar with overall lower RSV during 2020, where it noticeably decreased in the month of March. Even as of today, the whole world is in pandemic era, the future studies may report the google trends, data and seasonal behavior for search term "anatomy" when each one of us will enter into the much-awaited pandemic-free world "The post-pandemic epoch".

Limitations

The lack of information from other search engines, governmental control of search engines and language barriers are the major limitations of the study, which could affect the full spectrum of searches. In addition, aspects related to internet use influence the relative interest in search term [1, 6].

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Declarations

Conflict of interest We have no conflicts of interest.

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