Trends in Online Searches for Oral and Maxillofacial Surgery During the COVID-19 Pandemic

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Research

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Abstract

Background: Dentists and dental staff involved in oral and maxillofacial surgery (OMS) are at high risk of infection during the coronavirus disease (COVID-19) pandemic. Therefore, prevention of viral infection is essential in OMS, and attention should be paid to the trends in OMS during COVID-19. In this study, we aimed to investigate the search trends in OMS during the COVID-19 pandemic using Google Trends (GT).

Methods: COVID-19 was considered prevalent from December 2019, and the search period on GT was set to 1 year (January 1, 2020–January 1, 2021). We observed trends for the following OMS-related terms: “wisdom teeth,” “TMJ” (temporomandibular joint), “dental implants,” “jaw surgery,” and “jaw fracture.” Additionally, the terms “aerosol” and “PPE” (personal protective equipment) were also used in the study. We identified the top five countries for all the aforementioned terms to confirm the trends by country. The multivariate Steel–Dwass test was used to compare the relative search volume (RSV) of the OMS-related terms, and the Mann–Whitney U test was used for comparison between the two groups of the COVID-19 prevention terms “aerosol” and “PPE.”

Results: The RSV showed a decreasing trend from March to April for the terms “wisdom teeth,” “TMJ,” and “dental implants”; however, there was an increasing trend for the same terms from May onward. The term “PPE” showed a sharp increase from March to April. In comparison by country during the 1-year period, the United States had the highest RSV for “wisdom teeth” and “jaw fracture,” and Malaysia had the highest RSV for “TMJ.” Similarly, the highest RSV for “dental implants” and “jaw surgery” was in Laos and Canada, respectively.

Conclusions: The COVID-19 pandemic may have altered the search trends for the terms “wisdom teeth,” “TMJ,” and “dental implants”.

Background

Coronavirus disease (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 that emerged in December 2019 and has been confirmed to be prevalent globally [1, 2].

The main modes of infection include direct infection by droplet inhalation through coughing and contact infection through mucous membranes, such as that of the mouth, nose, and eyes [3].

Healthcare workers, in particular, have a greater chance of getting infected with the virus through patients. To date, 29% of general healthcare workers have reportedly been infected [4]. Dentists and dental staff are also at a high risk of infection [5], especially those belonging to the specialization of oral and maxillofacial surgery (OMS) [6].

Therefore, prevention of viral infection is essential in OMS, and attention should be paid to the trends in OMS during COVID-19.

In Google Trends (GT; Alphabet Inc., Mountain View, California, United States), when a search term is entered, the data of the search term is displayed as relative search volume (RSV) from 0 to 100. The peak of the search term is 100; e.g., an RSV of 50 means that a term is half as popular as the peak search term at that time. The geographical search volume is not an absolute number, but a percentage of the total number of searches in a location [7–12].

Trends in OMS have previously been reported using GT [7]; however, there have been no reports on the change in the trends during the COVID-19 pandemic. Additionally, in the field of OMS, COVID-19 prevention is important for a safe work environment, and it is particularly necessary to pay attention to “aerosol” and personal protective equipment (“PPE”) [13].

Further, knowing the changes in OMS trends during the COVID-19 pandemic is important to understand the public’s interest in the field.

In this study, we investigated the search trends in OMS during the COVID-19 pandemic period (2020) using GT.

Methods

Data source

GT was used to collect data on online search trends. Entering the terms "wisdom teeth," "TMJ" (temporomandibular joint), "dental implants," "jaw surgery," "jaw fracture," "aerosol," or "PPE" yielded RSVs. The RSV is based on normalized search data and is presented on a scale from 0 to 100, with 100 representing the maximum number of searches in a given time period. [7-12].

Evaluation period

COVID-19 is considered to have been prevalent since December 2019, and the evaluation period of 1 year was defined as January 1, 2020, to January 1, 2021.

Search terms

We used the search terms “wisdom teeth,” “TMJ” (temporomandibular joint), “dental implants,” “jaw surgery,” and “jaw fracture,” which have been used as OMS terminologies from 2004 to 2019 [7].

Additionally, the terms “aerosol” and “PPE,” which are relevant for COVID-19 prevention in the field of OMS, were also used in this study.

Geographic trends

The five countries with the highest search numbers for the terms “wisdom teeth,” “TMJ,” “dental implants,” “jaw surgery,” “jaw fracture,” [7] “aerosol,” and “PPE” were used to identify the trends by country.

Statistical analysis

Statistical analysis was performed using BellCurve for Excel (Social Survey Research Information Co., Ltd.) to analyze the results of the OMS-related terms.

For comparison between the RSVs of the OMS-related terms, the multivariate Steel–Dwass test was used, and for comparison between the two groups of the COVID-19 prevention terms “aerosol” and “PPE,” the Mann–Whitney U test was used. A P-value $\leq .05$ was considered statistically significant.

Results

Figure 1 shows the RSV for the terms “wisdom teeth,” “TMJ,” “dental implants,” “jaw surgery,” and “jaw fracture” from January 1, 2020, to January 1, 2021. The RSV for the term “wisdom teeth” dropped sharply in April; however, it has remained around 80 since May.

Figure 2 presents the box-and-whisker diagrams for the terms “wisdom teeth,” “TMJ,” “dental implants,” “jaw surgery,” and “jaw fracture.” Searches for “wisdom teeth” (median 76) were higher than that for “TMJ” (median 43.5). The bulk search for “dental implants” (median 33.5) was significantly different from that for “TMJ” (median 43.5), “dental implants” (median 33.5), “jaw surgery” (median 6), and “jaw fracture” (median 1). The RSV for “TMJ” was significantly different ($P < 0.01$) from that for “dental implants,” “jaw surgery,” and “jaw fracture.” There was a significant difference ($P < 0.01$) among “dental implants,” “jaw surgery,” and “jaw fracture.”

Figure 3 shows the trend of the RSV for “aerosol” and “PPE” from January 1, 2020, to January 1, 2021. The RSV of PPE increased from March to April.

Figure 4 shows the box plots for aerosols and PPE. There was a significant difference between aerosol (median 14) and PPE (median 23).

Table 1 shows the geographical trends of OMS-related terms from 2004 to 2019 and 2020 and that of the COVID-19 prevention-related terms in 2020. The country that most frequently searched for “wisdom teeth” and “jaw fracture” was observed to be the United States from 2004 to 2019 and was the same in 2020. This position for “TMJ” was held by Malaysia from 2004 to 2019 and was the same in 2020. The term “dental implants” was most searched by St. Helena during 2004 to 2019 and by Laos in 2020. The country that searched for “jaw surgery” the most was Singapore during 2004 to 2019 and Canada in 2020. For “aerosol,” the countries in descending order of the RSV were Argentina, Paraguay, Mexico, Italy, and Uruguay. For “PPE,” the countries in a similar order were the Philippines, the United Kingdom, South Africa, Ireland, and Nepal.

Discussion

COVID-19 was declared a pandemic by the World Health Organization on March 11, 2020 [14]. Following this declaration, there was a decrease in the RSV for “wisdom teeth,” “TMJ,” and “dental implants”; however, an increase in these RSVs was observed after May. This might have been attributed to patients refraining from undergoing surgery to prevent infection during the spread of COVID-19.

One of the characteristics of the year 2020 has been the rapid increase in the RSV of “PPE,” and the interest in “PPE” was especially high during April and May. In contrast, following the decrease in the RSV of “PPE” in June, the RSV of “wisdom teeth,” “TMJ,” and “dental implants” showed an increase. These trends denote that in April and May, the focus was on PPE with an aim of infection prevention; however, from June onward, the conditions relating to the pandemic had improved, and procedures involving “wisdom teeth,” “TMJ,” and “dental implants” had restarted.

In the RSV comparison for OMS terms, the median value for “wisdom teeth” was 76 throughout the year, which was higher than that of “TMJ,” “dental implants,” “jaw surgery,” and “jaw fracture,” even during the COVID-19 pandemic, suggesting the high demand for the treatment of “wisdom teeth.”

The geographic trends of search terms in 2020 are the same as those from 2004 to 2019, with an increase in the number of searches in the United States, Australia, New Zealand, and the United Kingdom after the start of the COVID-19 pandemic, suggesting that OMS continues to be practiced in the regions considered to be developed countries and that the environment allows easy access to the Internet.

The country with the highest number of searches for “dental implants” in 2020 was Laos. In Laos, as well as in St. Helena, the country with the highest number of searches for the same term from 2004 to 2019, a part of the population is highly interested in “dental implants,” which might have led to the increased number of searches.

Regarding the trends for terms related to COVID-19 prevention, four of the top five countries for “aerosol” searches were from Latin America. This suggests that Latin America has actively educated its population about COVID-19 prevention. The RSV for “PPE” was observed to be high in the Philippines, the United Kingdom, South Africa, Ireland, Nepal, Southeast Asia, Northern Europe, Africa, and a wide area of the world where COVID-19 prevention has been considered important. This study is a useful collection of information for establishing guidelines for patients with COVID-19 in OMS [15].

One of the limitations of this study is that the only search engine used was Google; however, this decision was based on the fact that Google is the most widely used search engine worldwide. Furthermore, the RSVs retrieved from GT showed only relative search interest and not the absolute total number of searches. The total number of searches by country was also unknown. The data obtained are useful to show the general search trend by country, but it should be noted that a high number of searches in a country with a small population may result in a high RSV. In addition, since the search terms evaluated in

this study were in English, the results do not reflect differences in language. In non-English speaking countries, the number of people using English terms on search engines online may be low.

However, we were able to learn about the search trends for "wisdom teeth," "TMJ," "dental implants," "aerosol" and "PPE" during the COVID-19 pandemic, which is meaningful information to examine whether the measures taken so far have been effective.

Conclusion

The results of the present study indicate a change in interest in terms related to OMS during the COVID-19 pandemic. Furthermore, during the COVID-19 pandemic, RSV increased for the terms "wisdom teeth," "temporomandibular joint," and "implant," whereas no change was observed for the terms "jaw surgery" and "jaw fracture." This change in the online interest for these three keywords suggests that the COVID-19 pandemic may have resulted in a change in the search trends for these terms.

Abbreviations

COVID-19: Coronavirus disease; GT: Google Trends; OMS: Oral and maxillofacial surgery; PPE: Personal protective equipment; RSV: Relative search volume; TMJ: Temporomandibular joint

Declarations

Ethics approval and consent to participate: Not applicable.

Consent for publication

Not applicable.

Data Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no conflicts of interest with respect to the publication of this paper.

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Authors' contributions

SS conceived this report, drafted the manuscript, and critically revised it for important intellectual content. TM and TT helped draft the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1

	2020–2021	2004–2019
Search term	Country (%*)	Country (%*)
Wisdom teeth	United States (100) Jamaica (81) Canada (77) Australia (75) New Zealand (72)	United States (100) Canada (84) Australia (81) New Zealand (70) Ireland (59)
TMJ	Malaysia (100) Canada (87) United States (70) Australia (53) New Zealand (41)	Malaysia (100) United States (66) Canada (47) Philippines (39) Australia (34)
Dental implants	Laos (100) United Kingdom (47) United States (45) Vietnam (41) Ireland (32%)	St Helena (100) Ireland (22%) United States (21) United Kingdom (19) Australia (16)
Jaw surgery	Canada (100) Australia (80) Ireland (76%) United States (72) Singapore (69)	Singapore (100) Canada (72) Australia (61) Ireland (60) United States (57)
Jaw fracture	United States (100) Australia (67) United Kingdom (66) Ireland (61%) India (46)	United States (100) Australia (92) Canada (74) United Kingdom (73) India (64)
Aerosol	Argentina (100) Paraguay (74) Mexico (73)	

	Italy (69)
	Uruguay (52)
PPE	Philippines (100)
	United Kingdom (86)
	South Africa (82)
	Ireland (72)
	Nepal (58)

(*)): Percentage of popularity in country compared with most popular location for term (100).

Wisdom teeth, TMJ, dental implants, jaw surgery, and jaw fracture from 2004 to 2019 and geographic trends in 2020 and aerosol and PPE geographic trends in 2020. *TMJ* temporomandibular joint,

PPE personal protective equipment

Figures

Figure 1

Google Trends RSV from January 1, 2020, to January 1, 2021. The term “wisdom teeth” showed a downward trend from March to April, but an upward trend since May is seen. TMJ: temporomandibular joint; PHEIC: Public Health Emergency of International Concern

Figure 2

Box plot is shown. × indicates an outlier. **: p<0.01. Throughout the year, the term “wisdom teeth” shows higher values than TMJ, dental implants, jaw surgery, and jaw fracture. TMJ: temporomandibular joint

Figure 3

Google Trends RSV from January 1, 2020, to January 1, 2021. The term “PPE” shows a sharp increase from March to April and a downward trend from April. PPE: personal protective equipment; PHEIC: Public Health Emergency of International Concern

Figure 4

The box plots for aerosols and PPE. PPE: personal protective equipment. There was a significant difference between aerosol (median 14) and PPE (median 23).