



# Google searches for bruxism, teeth grinding, and teeth clenching during the COVID-19 pandemic

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Received: 20 November 2020 / Accepted: 1 May 2021 / Published online: 29 June 2021  
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## Abstract

**Purpose** Whether coronavirus disease 2019 (COVID-19) pandemic has an impact on bruxism represents an important gap of knowledge. This study evaluated the trends in Google searches, as an indication of public interest and demand, for bruxism and its symptoms during the COVID-19 pandemic.

**Methods** Google Trends was queried for bruxism, teeth grinding, and teeth clenching both worldwide and in the United States. Two periods in 2020 (March 15–May 9 and May 10–October 17) were compared to similar periods of 2016–2019 to investigate both initial and short-term interest.

**Results** The relative search volume of bruxism, teeth grinding, and teeth clenching was not significantly different between 2020 and 2016–2019 worldwide or in the United States in the March 15–May 9 period. Only the search for teeth grinding showed an increase worldwide. In the May 10–October 17 period, the relative search volume of bruxism, teeth grinding, and teeth clenching all was significantly higher in 2020 compared to 2016–2019 both worldwide and in the United States.

**Conclusion** The study showed that the relative search volume for bruxism, teeth grinding, and teeth clenching, as an indication of public interest and demand, was increased both worldwide and in the United States during the May–October 2020 period compared to similar periods of the previous 4 years. Dentists should address this increased public interest and demand for information seeking for bruxism. Follow-up studies monitoring long-term interest as a real-time surveillance and evaluating whether increased internet searches are linked to an actual increase or worsening of bruxism and its symptoms in the clinic are required.

**Keywords** Google Trends · Internet search engines · Psychological distress · Dentistry · Dentists

## Google-Suchanfragen zu Bruxismus, Zähneknirschen und Zähnepressen während der COVID-19-Pandemie

### Zusammenfassung

**Ziel** Ob die COVID („coronavirus disease 2019“)-Pandemie einen Einfluss auf Bruxismus hat, stellt eine wesentliche Forschungslücke dar. In dieser Studie wurden die Trends in den Google-Suchanfragen, als Anhaltspunkt für öffentliches Interesse und die entsprechende Nachfrage, für Bruxismus und seine Symptome während der COVID-19-Pandemie ausgewertet.

**Methoden** Google Trends wurde für Bruxismus, Zähneknirschen und Zähnepressen sowohl weltweit als auch in den USA abgefragt. Zwei Zeiträume im Jahr 2020 (15.03.–09.05. und 10.05.–17.10.) wurden mit ähnlichen Zeiträumen der Jahre 2016–2019 verglichen, um sowohl das initiale als auch das kurzfristige Interesse zu untersuchen.

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**Ergebnisse** Das relative Aufkommen der Suchanfragen zu Bruxismus, Zähneknirschen und Zähnepressen unterschied sich im Zeitraum vom 15.03.–09.05. weder weltweit noch in den USA statistisch signifikant zwischen 2020 und 2016–2019. Nur die Suche nach Zähneknirschen zeigte weltweit einen Anstieg. Im Untersuchungszeitraum 10.05.–17.10. war das relative Suchvolumen bezüglich Bruxismus, Zähneknirschen und Zähnepressen im Jahr 2020 im Vergleich zu 2016–2019 sowohl weltweit als auch in den USA signifikant höher.

**Schlussfolgerung** Die Studie zeigte, dass das relative Suchvolumen für Bruxismus, Zähneknirschen und Zähnepressen als Hinweis auf öffentliches Interesse und Nachfrage sowohl weltweit als auch in den Vereinigten Staaten während des Zeitraums von Mai bis Oktober 2020 im Vergleich zu ähnlichen Zeiträumen der vorangegangenen 4 Jahre erhöht war. Zahnärzte sollten dieses erhöhte öffentliche Interesse und die Nachfrage nach Informationen über Bruxismus ansprechen. Folgestudien, die das langfristige Interesse im Sinne einer Echtzeitüberwachung beobachten und auswerten, ob die erhöhte Internetsuche mit einer tatsächlichen Zunahme oder einer Verstärkung von Bruxismus und seinen Symptomen in der Klinik verbunden ist, sind erforderlich.

**Schlüsselwörter** Google Trends · Internetsuchmaschinen · Psychische Belastungen · Zahnmedizin · Zahnärzte

## Introduction

The rapid spread of the coronavirus disease 2019 (COVID-19) pandemic resulted in 38,202,956 confirmed cases and 1,087,069 deaths worldwide, as of October 15, 2020 [1]. To control its widespread transmission, containment measures were implemented including strict quarantine and lockdown. These measures triggered an economic recession and financial crisis with an unprecedented rise in unemployment [2, 3]. The health crisis coupled with its negative social and economic consequences have led to a considerable increase in levels of psychological distress and sleep disorders as well as in alcohol consumption among the general population [4–8].

Google (Google LLC, Mountain View, CA, USA) searches data have been used to track public interest in a broad range of dental topics such as dental carries, molar incisor hypomineralization, and amber necklace [9–11]. Furthermore, in a recent infodemiological study the seasonality of Google searches of bruxism and its symptoms was evaluated [12]. In the context of the COVID-19 pandemic, Google searches data have been leveraged to evaluate public interest in COVID-19 terms [13, 14], mental health issues [15, 16], and insomnia [17]. All these studies demonstrate Google searches as being a powerful tool in monitoring public interest.

Although psychological distress, sleep disorders as well as high alcohol consumption are well-documented risk factors for bruxism [18–22], whether COVID-19 pandemic has an impact on bruxism represents an important gap of knowledge. To address this major gap, the present study evaluated the trends in Google searches, as an indication of public interest and demand, for bruxism and its symptoms during the COVID-19 pandemic.

## Materials and methods

The present study followed the recommendations of the recent article by Mavragani et al. addressing the methodological framework in using Google Trends in health research [23]. The Google Trends tool and data are explained in detail elsewhere [24, 25]. In brief, Google Trends, a freely accessible tool, provides information on trends of keywords that people search for on Google. It allows exploring variations both in individual countries and worldwide. Google Trends normalizes search data to the time period and region selected, and then transforms it to a 0–100 scale for making comparisons easier. Greater values indicate greater relative search volume (RSV).

The Google Trends was queried for the three keywords: (1) bruxism, (2) teeth grinding, and (3) teeth clenching. Time period of search was set to January 01, 2016, to October 20, 2020, with a selection of all categories. This search strategy was performed worldwide and in the United States, the most affected country in terms of COVID-19 cases and deaths. All RSV data were downloaded for exploring the trends.

Two periods in 2020 (March 15–May 9 and May 10–October 17) were compared to similar periods of the previous 4 years (2016–2019) to investigate both initial and short-term interest. In addition, a time series chart was generated to visualize the trends for bruxism, teeth grinding, and teeth clenching in 2016–2019 and 2020. Weekly data were transformed to monthly data for the time series chart. The World Health Organization (WHO) declared a pandemic just before mid-March; therefore, dates after March 15, 2020 were chosen in comparisons. The first period (March 15–May 9) coincides with implemented quarantine measures just after the WHO declaration of a pandemic; therefore, it provides the interest during the initial phase of the pandemic. The second period provides the interest during the pandemic period, which coincides with

lightening/lifting the imposed quarantine measures. A generalized estimating equation with a gamma distribution was utilized in the comparisons. Statistical analysis was performed in SPSS® v. 21.0 (IBM, Armonk, NY, USA) and the time series chart was generated on Excel v. 14.3.7 (Microsoft, Redmond, WA, USA) and data were presented as per standard recommendations [26].

### Results

In the initial period, March 15–May 9, the relative search volume of bruxism and teeth clenching was not significantly different between 2020 and 2016–2019 worldwide or in the United States. In this period, the worldwide relative search volume of teeth grinding (change: 11.5%,  $p=0.017$ ) was significantly higher in 2020 than in 2016–2019; however, it was not significantly different in the United States (change: 5.2%,  $p=0.304$ ) (Table 1).

In the May 10–October 17 period, the relative search volume of bruxism (worldwide, change: 23.6%,  $p<0.001$ ; United States, change: 9.8%,  $p=0.005$ ), teeth grinding (worldwide, change: 24.9%,  $p<0.001$ ; United States, change: 17.2%,  $p<0.001$ ), and teeth clenching (worldwide, change: 22.5%,  $p<0.001$ ; United States, change: 13.6%,  $p=0.002$ ) was significantly higher in 2020 than in 2016–2019 (Table 1).

Fig. 1 shows that the relative search volume of bruxism, teeth grinding, and teeth clenching was numerically similar in 2020 and in 2016–2019 in March; then it was numerically higher in all the other months (April through October) in 2020 compared to the mean of 2016–2019 both worldwide and in the United States.

### Discussion

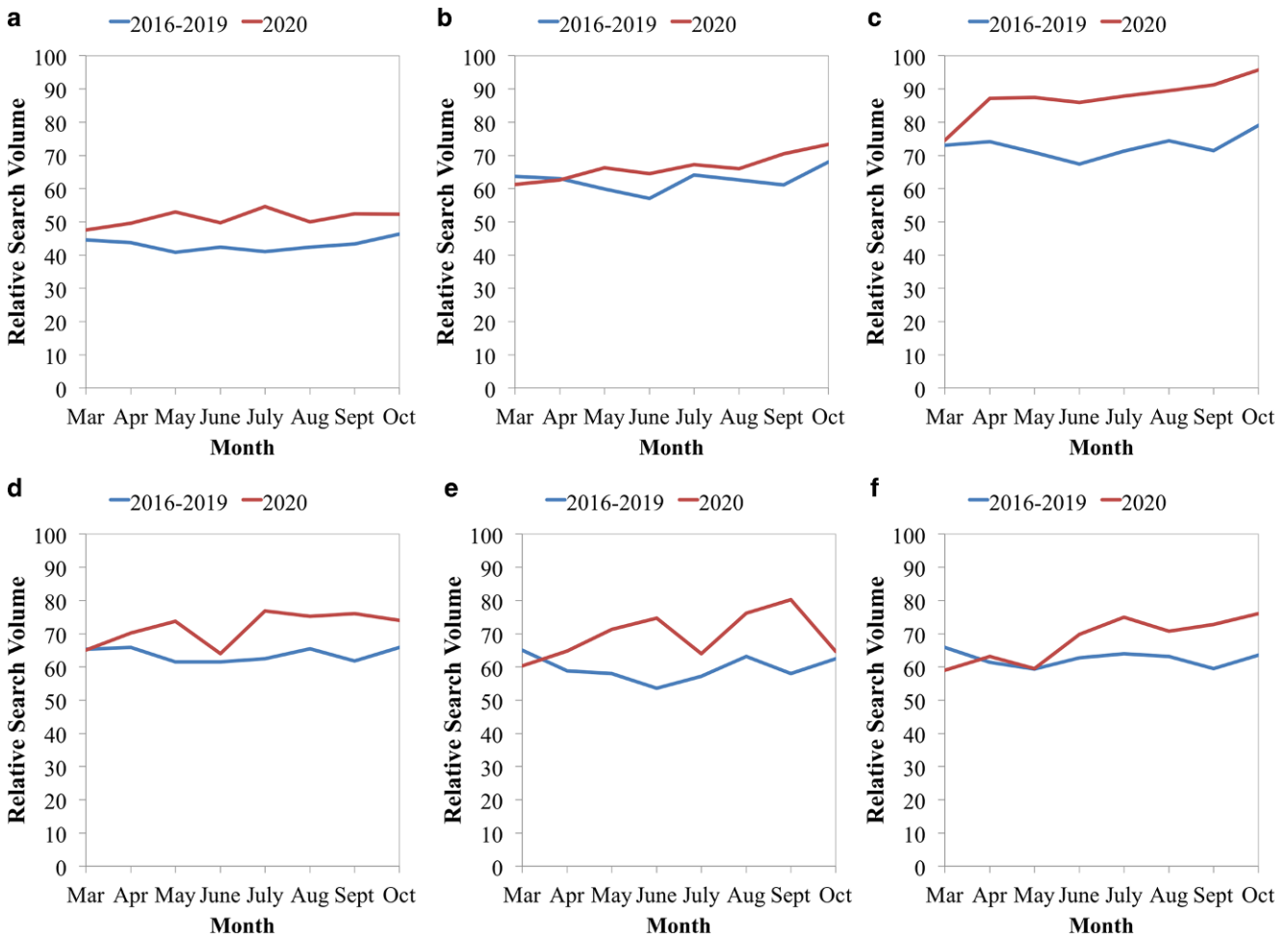
The study found that the relative search volume of bruxism, teeth grinding, and teeth clenching was not significantly different between 2020 and 2016–2019 worldwide or in the United States in the initial period, March 15–May 9. Only the search for teeth grinding showed an increase worldwide. However, after the initial period, the relative search volume of bruxism, teeth grinding, and teeth clenching increased and was significantly higher in 2020 compared to 2016–2019 both worldwide and in the United States.

In the initial period, relative search volume of bruxism and teeth clenching was not different between 2020 and 2016–2019 worldwide. In addition, the relative search volume of bruxism, teeth grinding and teeth clenching was not different between 2020 and 2016–2019 in the United States. Previous studies using Google Trends showed that in this initial period the relative search volume of COVID-19 terms (e.g., coronavirus), COVID-19 symptoms (e.g., cough, diarrhea, and loss of smell) and some mental health issues (e.g., anxiety) increased but the relative search volume of general health issues (e.g., dermatologic conditions and rheumatic diseases) decreased [13–16, 27–34]. We believe that our finding (no difference) in the initial period is important considering the previous studies’ results that showed a significant decrease in general health issues reflecting a shift of public interest from general health issues to COVID-19 [32–34]. Therefore, our finding indicates that the public remarkably searched for bruxism and its symptoms in the initial pandemic period. After the initial period, relative search volume of bruxism, teeth grinding and teeth clenching all were significantly increased compared to similar periods of the previous 4 years. This finding may

**Table 1** Relative search volume of bruxism, teeth grinding, and teeth clenching worldwide and in the United States  
**Tab. 1** Relatives Aufkommen von Anfragen zu Bruxismus, Zähneknirschen und Zähnepressen weltweit und in den USA

|                        | March 15–May 9      |                     |                     |         | May 10–October 17   |                     |                     |         |
|------------------------|---------------------|---------------------|---------------------|---------|---------------------|---------------------|---------------------|---------|
|                        | 2020                | 2016–2019           | % Change            | P value | 2020                | 2016–2019           | % Change            | P value |
| <i>Bruxism</i>         |                     |                     |                     |         |                     |                     |                     |         |
| Worldwide              | 47.6<br>(44.4–51.1) | 45.0<br>(42.3–47.1) | 6.8<br>(–2.7–16.3)  | 0.152   | 52.2<br>(50.6–53.8) | 42.2<br>(40.9–43.6) | 23.6<br>(18.2–29.0) | <0.001  |
| United States          | 61.3<br>(57.1–65.8) | 63.2<br>(58.2–68.6) | –3.0<br>(–13.5–7.5) | 0.581   | 67.7<br>(64.5–71.0) | 61.6<br>(59.0–64.4) | 9.8 (2.7–17.0)      | 0.005   |
| <i>Teeth grinding</i>  |                     |                     |                     |         |                     |                     |                     |         |
| Worldwide              | 83.0<br>(76.7–89.8) | 74.4<br>(71.7–77.2) | 11.5<br>(1.9–21.2)  | 0.017   | 89.5<br>(86.9–92.2) | 71.7<br>(70.1–73.4) | 24.9<br>(20.2–29.5) | <0.001  |
| United States          | 68.9<br>(63.3–75.0) | 65.5<br>(62.7–68.3) | 5.2<br>(–4.8–15.2)  | 0.304   | 73.7<br>(71.4–76.1) | 63.0<br>(61.4–64.5) | 17.2<br>(12.4–21.9) | <0.001  |
| <i>Teeth clenching</i> |                     |                     |                     |         |                     |                     |                     |         |
| Worldwide              | 64.6<br>(58.3–71.7) | 61.0<br>(56.6–65.7) | 6.0<br>(–7.5–19.5)  | 0.376   | 71.2<br>(65.5–77.4) | 58.1<br>(55.3–61.1) | 22.5<br>(10.7–34.4) | <0.001  |
| United States          | 62.9<br>(58.6–67.5) | 61.9<br>(57.9–66.2) | 1.6<br>(–8.3–11.5)  | 0.748   | 70.7<br>(66.0–75.6) | 62.2<br>(59.9–64.5) | 13.6<br>(4.9–22.4)  | 0.002   |

Relative search volume values are presented as a mean (95% confidence interval) (generalized estimating equations)



**Fig. 1** Relative search volume of (a) bruxism worldwide, (b) bruxism in the United States, (c) teeth grinding worldwide, (d) teeth grinding in the United States, (e) teeth clenching worldwide, (f) teeth clenching in the United States. The data of October was based on partial data of October  
**Abb. 1** Relatives Volumen von Suchanfragen für (a) Bruxismus weltweit, (b) Bruxismus in den USA, (c) Zähneknirschen weltweit, (d) Zähneknirschen in den USA, (e) Zähneknirschen weltweit, (f) Zähneknirschen in den USA. Die Daten vom Oktober basierten auf Teildaten vom Oktober

indicate that the COVID-19 pandemic had a negative impact on bruxism and its symptoms. Several factors might have contributed to this observed increase. COVID-19-related deaths, strict quarantine/lockdown measures, and economic recession/financial crisis/rise in unemployment have led to considerable increases in the levels of psychological distress in the general public [4, 6]. Furthermore, alcohol consumption has increased during the pandemic [8]. Since psychological distress as well as high alcohol consumption are well-documented risk factors for bruxism [18–22], the increase in intensity of these risk factors might have led to or worsen existing bruxism. Although the present findings require verification with clinical studies, health-care providers should address the increased public interest and demand for information regarding bruxism.

Previous studies evaluated the trends in Google searches for mental health issues and insomnia [15–17]. Hoerger et al. compared mental health-related Google searches in

the United States during the initial pandemic period (first 40 days following March 11, 2020) with the prepandemic period [15]. They found significant increases in searches related to worry, panic, and anxiety; however, no significant changes were detected in searches related to depression, loneliness, or suicide in the initial pandemic period compared with the prepandemic period [15]. They suggested continued surveillance of Google searches for these terms because changes in these terms may occur later [15]. Ayers et al. evaluated the search terms for anxiety or panic in combination with attack in the United States. They found that acute anxiety searches were higher than expected for the initial pandemic period (first 58 days following March 13, 2020) [16]. In a study examining Google searches for insomnia worldwide and in the United States, Zitting et al. showed a decrease in searches for insomnia in March and then a large increase in April and May 2020 [17]. The

present study provides insights into the potential impact of the COVID-19 pandemic on bruxism and its symptoms.

Two previous cross-sectional studies using online surveys to investigate the population's self-reported bruxism symptoms and their worsening during the COVID-19 pandemic are available in the literature [35, 36]. In the study by Emodi-Perlman et al., a total of 700 participants from Israel and 1092 participants from Poland fully completed the survey [35]. They found that 40 and 32% of Israeli and 68 and 50% of Polish participants reported possible/probable awake bruxism and possible/probable sleep bruxism, respectively [35]. They also showed that 16 and 13% of Israeli and 34 and 28% of Polish participants reported awake bruxism aggravation and sleep bruxism aggravation, respectively [35]. In the other cross-sectional study by Javaid et al., 1021 participants from around the world completed the survey [36]. They found that 13% of participants reported bruxism symptoms during the pandemic [36]. Furthermore, in an overview article, Hassan and Khier hypothesized that awake bruxism might be triggered/worsened during the pandemic due to increased/accumulated stress [37]. The design of the present study differs from the previously published two survey studies and our results indicate increased internet searches for bruxism and its symptoms during the pandemic.

### Limitations

There were limitations with the present study. First, we only analyzed Google engine searches. However, since approximately 90% of all internet searches conducted on it [38], Google searches may be representative for all internet searches. Second, Google Trends does not allow analyzing in various subpopulations (e.g., male/female). Therefore, the results are only applicable for whole population. Third, internet use may be lower in some subpopulations (e.g., illiterate, older adults); hence, these subpopulations might be excluded or underrepresented. Fourth, our search strategy was by no means exhaustive—rather, focused only on internet searches for bruxism and its symptoms (i.e., teeth grinding and teeth clenching). Adding some other keywords such as headache, toothache, neck pain, and jaw pain into our search strategy would have managed to allow a better interpretation of the study results. Fifth, we have no information on the motivation or intention of internet searches for bruxism, teeth grinding and teeth clenching. It is possible that an increased number of popular scientific health-related publications on bruxism may lead to a rise in its internet searches or increased interest in seeking head and neck pain-related information might contribute to searches for bruxism. Considering these possible factors/reasons behind the observed increase in internet searches, it is not possible to attribute all the changes only to the pandemic.

Furthermore, the study provided no evidence of whether the COVID-19 pandemic has caused an increasing demand for dental treatment. Sixth, the global results of the study should be interpreted with caution and by bearing in mind the facts that the seasons are reversed between northern and southern hemispheres and previous studies showed seasonality in internet searches of several health topics including bruxism [12]. Seventh, we were able to investigate only initial and short-term interest. A follow-up study is needed to monitor long-term interest as a real-time surveillance. Lastly, whether the present findings are associated with actual increase or worsening in bruxism and its symptoms deserves future evaluation.

### Conclusion

The present study showed that the relative search volume for bruxism, teeth grinding, and teeth clenching, as an indication of public interest and demand, was increased both worldwide and in the United States during the May–October 2020 period compared to similar periods of the previous 4 years. Dentists should address this increased public interest and demand for information seeking for bruxism. Follow-up studies monitoring long-term interest as a real-time surveillance and evaluating whether increased internet searches are linked to an actual increase or worsening of bruxism and its symptoms in the clinic are required.

**Conflict of interest** E. Kardeş and S. Kardeş declare that they have no competing interests.

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