

## Evaluation of Treatment and Dentist Options for Patients with Toothache in Turkey Using Google Trends

Ahmet Akay<sup>1\*</sup> , Seda Erkan Akay<sup>1</sup> 

1.Harran University, Faculty of Dentistry, Department of Endodontics, Şanlıurfa, Türkiye.

\*Corresponding author: Akay A., Msc.,PhD.,Ass. Prof., Harran University, Faculty of Dentistry, Department of Endodontics, Şanlıurfa, Türkiye.  
E-mail: dtahmetakay@harran.edu.tr  
Orcid no: 0000-0002-1217-5911

### Abstract

**Background:** This study aimed to explore research conducted by individuals in Turkey using the Google search engine to gather information on treatments for toothaches, specifically extractions or root canal procedures. It also sought to compare how the preference for searching public dental hospitals or private clinics for these treatments has evolved over time.

**Materials and Methods:** Changes in search terms such as “toothache”, “root canal treatment”, “tooth extraction”, “private dental clinic”, and “public dental hospital” on Google Trends from May 8, 2010, to November 10, 2024, were analyzed. The study was conducted in Turkey; therefore, Turkish equivalents of the terms were utilized in the search. The reasons for these changes and their connections were thoroughly analyzed.

**Results:** The peak relative search volume (RSV) for toothaches occurred in April 2020, with tooth extraction and root canal treatment being equally popular. In February 2011, most of the searches were conducted for "public dental hospitals." Conversely, in September 2024, "private dental clinics were the most frequently searched terms. Prior to March 2020, public hospitals garnered more interest; however, since then, private dental clinics have become more popular among users.

**Conclusion:** It can be concluded that they are seeking a reliable dentist for their treatment, rather than any dentist, and gather information about the treatments they are going to undergo. Despite the development of implant treatment over time, it can be concluded that patients search root canal treatment as much as tooth extractions.

**Research Article (HRU Int J Dent Oral Res 2025; 5(1):20-23)**

**Keywords:** Toothache, google trends, root canal treatment, tooth extraction.

### Introduction

The World Health Organization (WHO) and the World Dental Federation (FDI) have identified the alleviation of toothache as a key priority within the Global Oral Health Promotion Agenda (1). Oral health is an essential element of overall health and wellbeing. Toothache may be caused by a number of factors including tooth decay, periodontal disease, or trauma. This seems to be more prevalent among socioeconomically disadvantaged groups (2). Toothaches have a detrimental impact on the quality of life of individuals. Consequently, individuals experiencing toothache may utilize the Internet to seek appropriate medication and treatment options. Furthermore, Internet users utilize online resources to corroborate professional instructions or

self-diagnose changes and/or diseases (2). A significant number of studies worldwide use internet data for analysis, with content analysis of platforms like Google Trends (GT), Twitter, and Instagram being notable examples (3-8). One of the most commonly used tools for studying online behavior is GT. This open-source tool offers data on trends and changes in online interest over time for specific keywords and topics(9).

In 2016, Google launched the GT tool, which provides free and publicly accessible data on online search trends related to Google's search engine. This represents a pioneering example of the utilization and analysis of big data in infodemiological studies (10).

Targeted oral health promotion strategies have the potential to meet the public's need for oral healthcare during and after the pandemic.

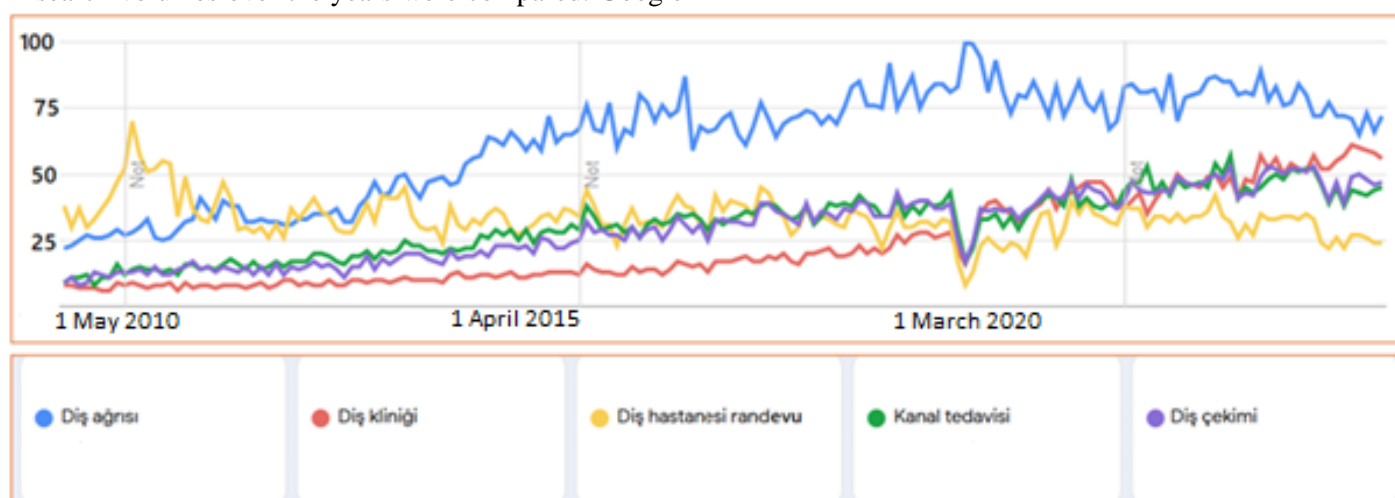
Furthermore, these findings can provide insights applicable to future public health emergencies, thus

improving preparedness and response measures for oral healthcare.

## Materials and Methods

This study examined the fluctuations in search volume for a range of dental-related terms, including toothache, root canal treatment, tooth extraction, private dental clinics, and dental hospital appointments, using Google Trends from 08.05.2010 to 11.05.2024. The objective was to ascertain the reasons for these changes and to identify any connections between them. Changes in search volumes over the years were compared. Google

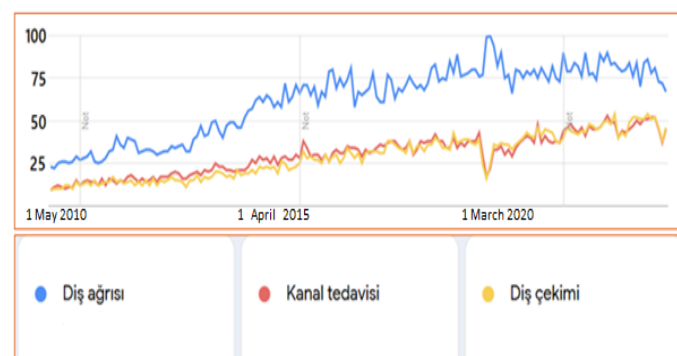
employs a proportional evaluation of the RSV values. The highest search volume was 100 (RSV=100). The keywords were in Turkish, as in the study conducted in Turkey. The terms "toothache", "root canal treatment", "tooth extraction", "public dental hospital" and "private dentist" were used in lieu of "diş ağrısı", "kanal tedavisi", "diş çekimi", "diş hastanesi randevu" and "diş kliniği", respectively (Figure 1). As no living beings were involved in our study, approval from the ethics committee was not obtained.



**Figure 1.** The evolution of search terms related to "toothache"(blue),"private dental clinic"(red), "public dental hospital"(yellow), "root canal treatment"(green) and "tooth extraction"(purple) over time is illustrated.

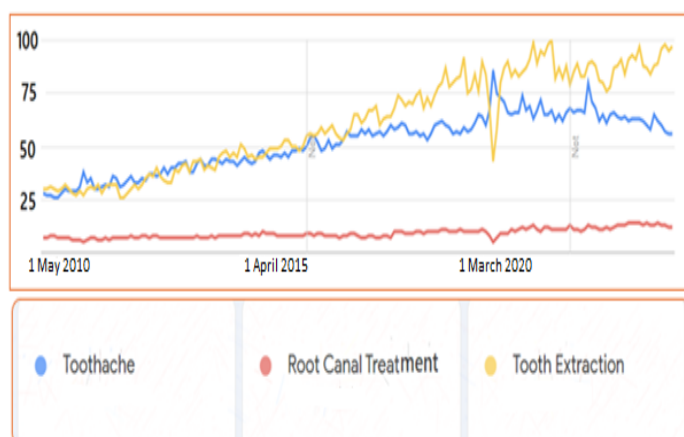
## Results

Most of the online searches were related to toothache information. The highest relative search volume (RSV) for toothaches was observed in April 2020 (RSV=100). It was noted that tooth extraction and root canal treatment were viewed as equally effective. Their lowest during the same period (RSV=15) (Figure 2). During the same period around the world, tooth extraction was a significantly more prevalent procedure than root canal treatment. (Figure 3). In February 2011, there was a notable increase in the number of searches for "public dental hospitals " compared with the previous months (RVS=64). Similarly, in July 2023, there was a surge in searches for "private dental clinics " compared to previous years (RSV=62). Prior to March 2020, there was a clear preference for

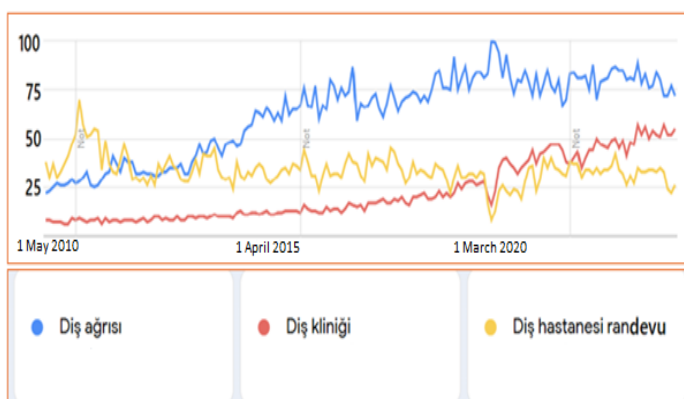


**Figure 2.** Change in interest in "root canal treatment" (red) and "tooth extraction" (yellow) in patients experiencing "toothache" (blue) over time in Turkey.

public hospitals, but since then, there has been a notable shift towards private dental clinics (Figure 4).



**Figure 3.** Change in interest in “root canal treatment” and “tooth extraction” among patients experiencing toothaches over time worldwide.



**Figure 4.** Change in interest in “private clinic” (red) and “public dental hospital” (yellow) in patients experiencing toothache (blue) over time in Turkey.

## Discussion

The data and graphs obtained demonstrate a notable increase in the number of individuals searching for information about toothaches on the internet over time. This trend can be attributed to enhanced accessibility and heightened awareness of the Internet in recent years. Although there has not been a notable increase in the number of individuals conducting internet search to determine whether to perform an extraction or a root canal procedure, the observation that the search rates for the two terms are similar indicates that it is primarily the same individuals who are engaged in this search. It is anticipated that individuals experiencing toothache, upon informed that pain is not caused by another factor, will evaluate the two options of root canal treatment or tooth extraction with equal consideration. Although the number of people using public facilities for their treatment was relatively

high in the early years, in recent years, there has been a notable shift in online searches for private clinics. This may be attributed to the challenges encountered in accessing services from public hospitals during the ongoing pandemic, which necessitates the exploration of private dental clinics. Since 2020, the number of searches for private dental clinics has increased in comparison with public dental hospitals. An important indicator is that the gap widened significantly in the last 1-2 years.

The Google Trends search results indicate that globally, tooth extraction is the most commonly sought procedure, followed by toothache and root canal treatment (Figure 3) (11). Because root canal treatments and tooth extractions are performed free of charge by the state in Turkey, this difference is not significant. Therefore, we believe that cost is an important factor in patients' decisions to undergo these procedures.

A study conducted in Sweden revealed that patients were required to pay approximately twice the amount for root canal treatment for tooth extraction (12). In a study conducted in India, the most important criterion for patients when deciding on treatment was cost (61.6%), followed by the dentist's qualification (51.1%). Patients seek successful doctors for treatment procedures because the success of the treatment procedure is related to the expertise of the doctor (13). In a study conducted in Iran, patients expressed a preference for extraction, indicating a desire to pursue more assured procedures throughout the decision-making process (14). This finding suggests that patients lack sufficient knowledge about root canal treatment and are generally receptive to dentists' recommendations. A study conducted in Nigeria found that patients were generally influenced by their dentist's advice when making a decision and were more likely to opt for extraction (15). A study in Australia found that access to private clinics offering treatment to preserve teeth in the mouth required a higher socioeconomic status. Patients from lower socioeconomic backgrounds tend to visit public hospitals where tooth extraction is more common (16). The period when Google searches for toothache was highest in Turkey and worldwide coincided with the global pandemic(17-19).

In 2010, patients began making appointments through the central appointment system (MHRS) via the internet for the first time. Therefore, we decided to begin our study that year. It is common for patients who lack knowledge of the topic to participate in online search. Therefore, it is considered normal that 2011 was the year in which the term "state dental hospital" was searched.

## Conclusion

In April 2020, "toothache" had the highest search volume (RSV=100), while "tooth extraction" and "root canal treatment" had the lowest and equal search volume (RSV=15). In Turkey, these two values consistently trended together, but globally, "tooth extraction" was always more common than "root canal treatment". In February 2011, the search volume for "public dental hospital" peaked at (RSV=64), but gradually declined over time. By July 2023, the search volume for "private dental clinic" reached its highest point at (RSV=62), while "public dental hospitals" reached its lowest at RSV=34. In January 2022, these RSV values were equal at (RSV=37).

In Turkey, people are now more attentive to oral health and seek reliable doctors. Despite advancements in implant treatment, patients research root canal treatment as thoroughly as tooth extraction.

**Conflict of Interest:**No conflict of interest was declared by the authors.

**Financial Disclosure:**The authors declared that this study has received no financial support.

**Author Contributions**The author contributions are listed as follows:

**Concept/Idea:** AA,SEA **Design:** AA,SEA  
**Revision/Consultation:** AA,SEA **Data collection or processing:** AA,SEA **Analysis and interpretation:** AA,SEA **Literature review:** AA,SEA **Manuscript writing:** AA,SEA **Critical review:** AA,SEA

## References

1. Martin H, Hobdell M, Petersen PE, Clarkson J, Johnson N. Global goals for oral health 2020. *Int Dent J*. 2003. 53(5): p. 285-8.
2. Mejia G, Armfield JM, Jamieson L. Self-rated oral health and oral health-related factors: the role of social inequality. *Australian dental journal*. 2014. 59(2): p. 226-233.
3. Zeraatkar K, Ahmadi M. Trends of infodemiology studies: a scoping review. *Health Information & Libraries Journal*. 2018. 35(2): p. 91-120.
4. Aquino-Canchari CR, Caira-Chuquineyra BS. Exploratory Google Trends study of user concerns about oral problems. *Revista Cubana de Investigaciones Biomédicas*. 2020. 39(3): p. 1-15.
5. Gupta AK and Quinlan EM. Google search trends in onychomycosis: Influences of flip flops and advertising. *Journal of Cosmetic Dermatology*. 2020. 19(10): p. 2736-2744.
6. Kamiński M, Łoniewski I., Marlicz W. "Dr. Google, I am in Pain"—global Internet searches associated with pain: a retrospective analysis of Google Trends data. *International journal of environmental research and public health*. 2020. 17(3): p. 954.
7. Sycinska-Dziarnowska M. and I. Paradowska-Stankiewicz, Dental challenges and the needs of the population during the covid-19 pandemic period. Real-time surveillance using google trends. *International journal of environmental research and public health*. 2020. 17(23): p. 8999.

8. Lotto M, Ayala Aguirre PE, Rios D, Machado MA, Cruvinel AFP. Analysis of the interests of Google users on toothache information. *PLoS One*. 2017. 12(10): p. e0186059.
9. Verma M, Kishore K, Kumar M, Sondh AR, Aggarwal G, Kathirvel S. Google Search Trends Predicting Disease Outbreaks: An Analysis from India. *Health Inform Res*. 2018;24(4):300-308. doi: 10.4258/hir.2018.24.4.300.
10. Jun S, Yoo HS, Choi S. Ten years of research change using Google Trends: From the perspective of big data utilizations and applications. *Technol Forecast Soc Change* 2018 May;130:69-87
11. Trends G. Google Trends 23.09.2024; Available from: <https://trends.google.com/trends/explore?cat=45&date=2010-01-1%202024-09-05&q=Toothache,Root%20Canal%20Treatment,Tooth%20Extraction>.
12. Wigsten E, Kvist T, Husberg M, Davidson T. Cost-effectiveness of root canal treatment compared with tooth extraction in a Swedish Public Dental Service: A prospective controlled cohort study. *Clinical and Experimental Dental Research*. 2023. 9(4): p. 661-669.
13. Nagarale R, Gunjal S, Patil S, Deshmukh, S, Pawar A. Extraction vs RCT-patient's treatment plan in accordance with dental pain. *International Journal of Dental Sciences*. 2023. 5(2): p. 41-44.
14. Parirokh M, Zarifian A, Ghodusi J. Choice of Treatment Plan Based on Root Canal Therapy versus Extraction and Implant Placement: A Mini Review. *Iran Endod J*. 2015 Summer;10(3):152-5. doi: 10.7508/iej.2015.03.001.
15. Enone LL, Awotile AO, Oyapero A, Nwabudike VI. Factors influencing patients' choice of treatment for a tooth with irreversibly damaged pulp. *Nigerian Journal of Clinical Medicine*. 2015. 7(1): p. 11-24.
16. Brennan DS, Luzzi L, Roberts-Thomson KF. Dental service patterns among private and public adult patients in Australia. *BMC Health Serv Res*. 2008 Jan 3;8:1. doi: 10.1186/1472-6963-8-1.
17. Sairi MN, Kamarudin Y, Nor NAM. Google Trends Analysis Of Toothache-Related Information-Seeking Behaviours During Covid-19 Pandemic In Malaysia. *Journal of Health and Translational Medicine (JUMMEC)*. 2024. 27(2): p. 131-138.
18. Sofi-Mahmudi A, Shamsoddin E, Ghasemi P, Mehrabi Bahar A, Shaban Azad M, Sadeghi G. Association of COVID-19-imposed lockdown and online searches for toothache in Iran. *BMC Oral Health*. 2021 Feb 15;21(1):69. doi: 10.1186/s12903-021-01428-z.
19. Rizzato VL, Lotto M, Lourenço Neto N, Oliveira TM, Cruvinel T. Digital surveillance: The interests in toothache-related information after the outbreak of COVID-19. *Oral Dis*. 2022 Nov;28 Suppl 2:2432-2441. doi: 10.1111/odi.14012.