NOFOR
NOVEL FORENSIC RESEARCH

DOI: 10.5455/NOFOR.2026.06.010

NOFOR. 2026;5(2):38-42

Original Article

An analysis of digital information-seeking behavior related to chronic pain in Türkiye: An infodemiology study based on Google trends

Ozlem Nur Tok Yaman, Harun Kenan, Ayse Seda Yolcu

Alanya Alaaddin Keykubat University, Faculty of Health Science, Department of Physical Therapy and Rehabilitation, Antalya, Türkiye

Received July 04, 2026; Accepted August 10, 2026; Available online August 15, 2026

Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Abstract

Aim: The objective of this study is to examine changes in search interest for the term chronic pain over the years, its distribution across provinces in Türkiye, seasonal variations, and other topics and queries related to chronic pain.
Materials and Methods: This retrospective descriptive infodemiology study was conducted to evaluate online information-seeking trends related to the term chronic pain in Türkiye. Google Trends was used to retrieve search data, with the Turkish phrase "kronik ağrı" entered as the search term. The search was limited to Türkiye as the geographic region and covered the period from January 1, 2004, to May 15, 2026. The Health category and Google Web Search were selected as the search settings.
Results: Relative search interest in chronic pain remained higher after 2011 compared with the 2004–2010 period, despite fluctuations over time. Burdur had the highest level of search interest among all provinces. Search volumes were found to be higher during the spring and winter months. In addition, topics related to chronic pain, including fibromyalgia, anxiety, depression, physical exercise, and neuropathic pain, emerged as the most frequently searched associated subjects.
Conclusions: Online search behavior related to chronic pain varies by time, region, and season. The fact that searches are concentrated around physical and psychological health topics related to chronic pain reflects the need for information regarding the biopsychosocial dimensions of chronic pain. Google Trends data can serve as a useful resource for assessing public interest in chronic pain, health information needs, and awareness of the potential effects of chronic pain on functioning and disability.

Keywords: Chronic pain; internet; health information seeking; infodemiology; public health

INTRODUCTION

Pain is defined as "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" and is a common health problem affecting a large proportion of the population [1]. Chronic pain refers to pain that persists for more than three months, even after the underlying cause has resolved. Beyond its physical impact, chronic pain is frequently associated with psychological and behavioral problems, including anxiety, depression, insomnia, and fear of movement [1,2]. The persistent nature of chronic pain often interferes with individuals' ability to perform activities of daily living and is considered one of the leading contributors to long-term disability and reduced quality of life [1]. Furthermore, chronic pain conditions such as low back pain are among the leading causes of functional impairment and disability worldwide [3].

The widespread availability of internet access has made online health information an indispensable resource for both patients and health-related research in recent years. Consequently, the internet provides a rich source of data on the health topics that attract public interest and the types of information people seek [3,4]. The analysis of these online health information–seeking behaviors

CITATION
Tok Yaman ON, Kenan H, Yolcu AS. An analysis of digital information-seeking behavior related to chronic pain in Türkiye: An infodemiology study based on Google trends. NOFOR. 2026;5(2):38-42. DOI: 10.5455/NOFOR.2026.06.010

Corresponding Author: Ozlem Nur Tok Yaman, Alanya Alaaddin Keykubat University, Faculty of Health Science, Department of Physical Therapy and Rehabilitation, Antalya, Türkiye
Email: ozlemnurtok7@gmail.com

DOI: 10.5455/NOFOR.2026.06.010

has led to the emergence of the concept of infodemiology in the scientific literature. Eysenbach defined infodemiology as "the science of the distribution and determinants of information in an electronic medium, especially the Internet, with the ultimate aim of informing public health and public policy" [5].

Google is the most widely used search engine worldwide [3]. Google Trends is a free service that provides data on the popularity of search terms from 2004 onward [4,6]. It is widely used in health research to examine and map trends in online information-seeking behavior related to health and disease [7]. As it is based on actual searches rather than self-reported responses, Google Trends can provide information that may be difficult to obtain through conventional surveys, while its real-time data reduce the time-related limitations of survey-based research [8].

Numerous studies have previously been conducted in the field of health using Google Trends data. Trends in online search behavior related to conditions such as asthma [9], depression [10], schizophrenia [6], multiple sclerosis [7], various mental disorders [11], and lower back pain [12] have been successfully analyzed. Previous studies using Google Trends to investigate pain-related search behavior have primarily examined the most commonly searched pain conditions worldwide (such as headache), the countries in which these conditions are most frequently searched, and changes in search interest over time [3]. In addition, a study conducted in Italy specifically explored the seasonal patterns of online searches related to low back pain [12]. However, to the best of our knowledge, no previous study has specifically investigated the term chronic pain using Google Trends data from Türkiye. Analyzing digital information-seeking behaviors related to chronic pain may help identify public information needs and areas of interest, thereby contributing to the planning of patient education, awareness initiatives, and clinical services according to community needs. Therefore, the aim of this study is to analyze online searches for the term chronic pain in Türkiye using Google Trends data. Our study aims to examine changes in the term chronic pain over the years, its distribution across provinces, differences in search rates by season, and to identify other topics and queries searched by those looking for the term chronic pain.

MATERIALS AND METHODS

Study Design

This study is a retrospective and descriptive infodemiology study conducted to examine online information-seeking trends related to the term chronic pain in Türkiye. Infodemiological studies provide complementary data on the public's health-related information-seeking behaviors by enabling the analysis of the temporal and geographic characteristics of search data generated by internet users [4,5].

Data Collection and Search Strategy

The research data was obtained from the open-access Google Trends platform, which shows the relative popularity of queries entered into the Google search engine. The search was performed on May 15, 2026. The Turkish phrase "kronik ağrı" was entered into the Google Trends search field and analyzed as a search term. The search parameters were limited to "Türkiye" as the geographic region, "January 1, 2004–May 15, 2026" as the time period, "Health" as the category, and "Google Web Search" as the search type. Google Trends normalizes search queries by taking into account the total Google search volume for a specified time period and geographic region, and presents the results as relative search volume values ranging from 0 to 100. On this scale, 100 indicates the highest relative search interest the term reached in the selected time period and region; 50 indicates relative interest equal to half of the highest level; and 0 does not indicate that absolutely no searches were conducted, but rather that there is insufficient data for the relevant period or region [4,12]. For this reason, the values obtained in the study were interpreted not as absolute search counts, prevalence of chronic pain, or number of patients, but as an indicator of relative online search interest.

Classification of Data

The data obtained from Google Trends were classified into five categories: search trends over time, geographic distribution by province, related topics, related queries, and seasonal search distribution. For the temporal analysis, changes in search interest in the term chronic pain were examined from 2004 to the date of data collection. For the geographic analysis, relative search volumes were compared across provinces in Türkiye for which sufficient data were available. Provincial values do not represent the absolute number of searches conducted in each province; instead, they indicate the relative share of searches for chronic pain among all Google searches conducted in that province.

Related topics and queries were evaluated using the topics and search terms associated with chronic pain searches during the same period, as reported by Google Trends. Both related topics and related queries were ranked by relevance. Related topics refer to subjects that Google identifies as conceptually associated with the search term, whereas related queries represent the specific terms entered by users in the search box.

For the seasonal analysis, monthly search data from January 1, 2004, to May 15, 2026, were grouped according to meteorological seasons. December, January, and February were classified as winter; March, April, and May as spring; June, July, and August as summer; and September, October, and November as autumn. The proportion of search values for each season within the total search values was calculated, and the results were presented as percentages.

Data Analysis

The data obtained from the Google Trends platform was exported in spreadsheet format and organized in Microsoft Excel. In line with the descriptive nature of the study, the data were analyzed using relative search volume and percentage values; the results were presented using line, bar, and pie charts. Since the study did

DOI: 10.5455/NOFOR.2026.06.010

not include any individual participant data, it was not possible to analyze user characteristics such as age, gender, education level, clinical diagnosis, and reason for the search.

Ethical Considerations

This study used anonymous, aggregated, and publicly available secondary data obtained from Google Trends. Since no personally identifiable data were collected and the study did not involve direct participation of human subjects, ethics committee approval and informed consent were not required [6,7,12].

RESULTS

The annual distribution of Google searches for the term "kronik ağrı" is presented in Figure 1. As shown in the figure, the search volume for chronic pain was insufficient between 2004 and 2010. From 2011 onward, however, search interest showed a fluctuating upward trend, with the most pronounced increase observed during the 2025–2026 period.

Figure 1. Changes in searches for the term chronic pain by year.

The distribution of users searching for the term "kronik ağrı" on Google by province is shown in the graph in Figure 2. According to this graph, the search rate stands out most prominently in Burdur Province, followed by Ağrı, Edirne, Bolu, and Erzincan Provinces.

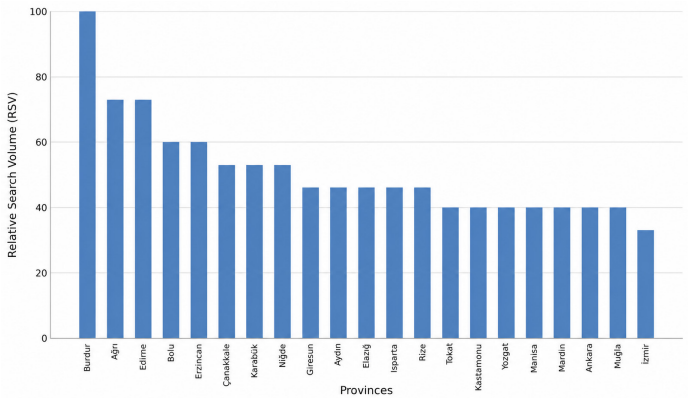

Figure 2. Distribution of searches for the term chronic pain by province.

Users who searched for the term "kronik ağrı" on Google also searched for the topics presented in Figure 3. As shown in the figure, "kronik durum" and "ağrı" were the most frequently searched topics. The remaining topics showed lower and relatively similar levels of interest. These included acute, licensed nurse, administration, pain management, risk, fibromyalgia, anxiety, depression, physical exercise, neuropathic pain, and definition.

In addition to these topics, users searching for "kronik ağrı" also performed the queries presented in Figure 4. The most frequently searched queries were "kronik", "ağrı" and "kronik ağrı" in that order. The English equivalents, "chronic" and "chronic pain," were also among the commonly searched queries. Less frequently searched queries included those related to the definition of chronic pain (e.g., "What is chronic pain?"), the concept of acute pain, and nursing care plans.

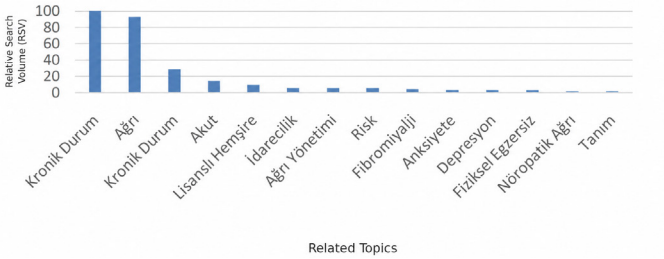

Figure 3. Other topics searched by users who searched for the term chronic pain.

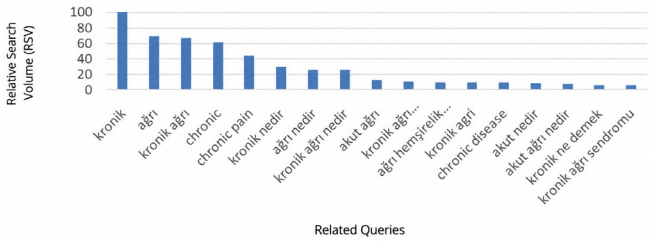

Figure 4. Other queries searched by users who searched for the term chronic pain.

Figure 5 shows the seasonal variation in Google searches for chronic pain. The graph reveals that the seasons with the most searches are spring (29%) and winter (27%), while the season with the fewest searches is summer (18%).

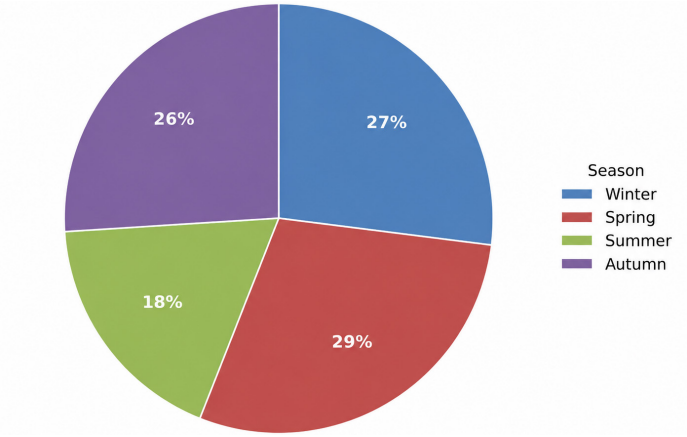

Figure 5. Seasonal changes in searches for chronic pain.

DISCUSSION

In this study, Google search trends for the term chronic pain in Türkiye were examined with respect to temporal changes, geographic distribution across provinces, related topics and queries, and seasonal patterns. The findings indicated that, although search interest fluctuated over time, it remained generally higher after 2011 compared with the 2004–2010 period. The highest level of search interest was observed in

DOI: 10.5455/NOFOR.2026.06.010

Burdur, while searches were more frequent during the spring and winter seasons. In addition, users commonly searched for topics associated with chronic pain, including fibromyalgia, anxiety, depression, physical exercise, and neuropathic pain.

In our study, we found that while relative search interest in the term chronic pain fluctuated after 2011, it remained at higher levels compared to the 2004–2010 period. In line with these findings, Patel and Shepherd reported that online information search behavior for low back pain increased significantly in the United Kingdom between 2007 and 2019 [13]. Similarly, Kamiński et al. found that Google searches for pain areas other than dyspareunia increased worldwide between 2004 and 2019 [3]. This change may be related to the increasing shift of health-related information-seeking behavior toward digital platforms over time. However, the upward trend in Google Trends data should not be interpreted as a direct increase in the prevalence of chronic pain. Online search volume can be influenced by many factors, such as internet access, digital health literacy, access to healthcare, media content, and social events. Similarly, Szilagyi et al. emphasized that internet search activity represents an indirect indicator of public interest rather than a direct measure of pain incidence or disease burden [14]. Consistent with this perspective, previous studies have reported increased searches for pain- and analgesic-related terms during the COVID-19 pandemic [15], a rise in searches related to pain and other symptoms following the announcement of the first official COVID-19 case in Türkiye [16], and higher search volumes for toothache compared with the pre-pandemic period [17]. These results suggest that changes in search trends may be related not only to the prevalence of diseases but also to health crises, uncertainty, and the public's interest in specific health issues.

In the present study, Burdur exhibited the highest relative search interest for the term chronic pain followed by Ağrı, Edirne, Bolu, and Erzincan. The absence of some highly populated provinces among the top-ranked regions may be explained by the fact that Google Trends reports normalized relative search interest rather than absolute search volumes, with search activity being adjusted according to the total number of Google searches performed in each region. Therefore, the fact that Burdur ranks first does not mean that this province has the highest number of chronic pain patients in Türkiye or that the highest absolute number of searches was conducted there. The findings merely indicate that the chronic pain search query accounts for a higher relative share of total Google searches in Burdur compared to other provinces. Sak and Uslu, who investigated internet searches related to schizophrenia in Türkiye, reported that relative search interest differed across provinces, but cautioned that regional findings should be interpreted carefully because users' characteristics and search motivations remain unknown [6]. Similarly, Uslu and Yıldırım, in their analysis of searches related to multiple sclerosis, found that major cities do not necessarily show the highest relative interest and suggested that regional rankings may be influenced by access to information, local awareness, and the use of digital resources [7]. Geographic differences may be influenced by numerous variables, such as the age distribution across provinces, access to health care, internet usage rates, educational attainment, occupational characteristics, the burden of chronic diseases, and local media content. However, since these variables were not examined in this study, no causal interpretation can be made regarding the reasons for the differences between provinces. Considering regional differences alongside epidemiological data may provide a more comprehensive understanding of search patterns. Future studies comparing Google Trends data with indicators such as the prevalence of chronic pain, the proportion of older adults, the number of healthcare facilities per capita, access to physical therapy and rehabilitation services, and regional internet use may help to better explain geographic variations in search interest.

The prominence of the terms "kronik durum", "ağrı", "kronik", "kronik ağrı", "chronic" and "chronic pain" among related topics and queries suggests that users searched for the concept using both Turkish and English terminology. In addition, queries such as "kronik ağrı nedir" "ağrı nedir" and searches related to acute pain indicate that users were seeking information about the definition of chronic pain and how it differs from acute pain. The presence of queries such as "hemşirelik bakım planı" also suggests that some searches may have been conducted for academic or professional purposes. However, because neither the identity of users nor their search intentions can be determined, these queries should not be interpreted solely as reflecting the health information needs of individuals living with chronic pain. The fact that fibromyalgia, neuropathic pain, anxiety, depression, and physical exercise are among the related topics suggests that the clinical and biopsychosocial dimensions of chronic pain are reflected in online searches. Fibromyalgia has previously been reported as one of the rheumatic diseases attracting the greatest relative search interest in Türkiye [18]. The prominence of anxiety and depression among related topics is consistent with the well-established bidirectional relationship between chronic pain and psychosocial factors [1,2]. Likewise, the interest in physical exercise may indicate that users are seeking information on non-pharmacological approaches to chronic pain management.

In the present study, searches for chronic pain were highest in spring (29%), followed by winter (27%) and autumn (25%), whereas the lowest proportion was observed in summer (18%). Consistent with our findings, Ciaffi et al. reported that Google searches for low back pain in Italy showed a significant seasonal pattern, with search interest increasing during colder months and decreasing in spring and summer [12]. The lower search interest during the summer months may be associated with changes in daily routines and reduced internet use during the holiday period. However, since Google Trends data do not reveal the underlying reasons for searches, it is not possible to draw a definitive conclusion on this matter. However, the higher search interest observed during spring in our study may be related to the broader clinical scope of chronic pain compared with low back pain, Türkiye's climatic characteristics, changes in physical activity patterns, or differences in online search behavior. Overall, these

DOI: 10.5455/NOFOR.2026.06.010

findings suggest that online health information-seeking behavior related to pain is not constant throughout the year and may vary across seasons.

Limitations

This study has some limitations. Because Google Trends presents relative values normalized to total search volume, not absolute search numbers, the findings cannot be interpreted as representing the prevalence, incidence, or clinical severity of chronic pain. Data includes only Google users; it does not represent groups using other search engines, social media platforms and health applications or those with limited internet access [13,17]. Because users' demographic and clinical characteristics, as well as their search intentions, are unknown, the findings cannot be generalized to a specific patient population. Limiting the analysis to the single search term chronic pain may have excluded other expressions commonly used in everyday language. In addition, updates to Google Trends sampling and normalization algorithms may lead to minor variations in the results. Geographic comparisons are also limited because the provincial search values represent relative search interest rather than epidemiologically standardized measures based on population size or the prevalence of chronic pain, and provinces with insufficient search volume are not included in the analysis.

CONCLUSION

In conclusion, online searches for chronic pain in Türkiye have increased over time, with variations across regions and seasons. Interest in fibromyalgia, neuropathic pain, anxiety, depression, and physical exercise reflects the biopsychosocial nature of chronic pain. Google Trends data may help identify public information needs and inform the planning of targeted health education, awareness initiatives, and rehabilitation services. Future studies combining online search data with epidemiological indicators and healthcare utilization data may provide a more comprehensive understanding of the societal burden of chronic pain.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
This study used anonymous, aggregated, and publicly available secondary data obtained from Google Trends. Since no personally identifiable data were collected and the study did not involve direct participation of human subjects, ethics committee approval and informed consent were not required.

Patient Consent
Patient consent was not required because this study did not involve human participants or identifiable personal data.

REFERENCES

1. Landmark L, Sunde HF, Fors EA, Kennair LEO, Sayadian A, Backelin C, et al. Associations between pain intensity, psychosocial factors, and pain-related disability in 4285 patients with chronic pain. Sci Rep. 2024;14:13477.
2. Rogers AH, Farris SG. A meta-analysis of the associations of elements of the fear-avoidance model of chronic pain with negative affect, depression, anxiety, pain-related disability and pain intensity. Eur J Pain. 2022;26:1611-35.
3. 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. Int J Environ Res Public Health. 2020;17:954.
4. Mavragani A, Ochoa G. Google Trends in infodemiology and infoveillance: methodology framework. JMIR Public Health Surveill. 2019;5:e13439.
5. Eysenbach G. Infodemiology and infoveillance: framework for an emerging set of public health informatics methods to analyze search, communication and publication behavior on the internet. J Med Internet Res. 2009;11:e11.
6. Sak FG, Uslu E. Google Trend verileri kapsamında infodemiyolojik bir çalışma: şizofreniye ilişkin bilgi arama eğilimi. Abant Saglik Bilimleri ve Teknolojileri Dergisi. 2023;3:23-31.
7. Uslu E, Yıldırım N. Multipl skleroz hakkında merak edilenler: Google Trend verileri. Gumushane Univ Saglik Bilim Derg. 2024;13:736-42.
8. Mavragani A, Tsagarakis KP. YES or NO: Predicting the 2015 GReferendum results using Google Trends. Technol Forecast Soc Change. 2016;109:1-5.
9. Sousa-Pinto B, Halonen JI, Antó A, Jormanainen V, Czarlewski W, Bedbrook A, et al. Prediction of asthma hospitalizations for the common cold using Google Trends: infodemiology study. J Med Internet Res. 2021;23:e27044.
10. Wang A, McCarron R, Azzam D, Stehli A, Xiong G, DeMartini J. Utilizing big data from Google Trends to map population depression in the United States: exploratory infodemiology study. JMIR Ment Health. 2022;9:e35253.
11. Soreni N, Cameron DH, Streiner DL, Rowa K, McCabe RE. Seasonality patterns of internet searches on mental health: exploratory infodemiology study. JMIR Ment Health. 2019;6:e12974.
12. Ciaffi J, Meliconi R, Landini MP, Mancarella L, Brusi V, Faldini C, et al. Seasonality of back pain in Italy: an infodemiology study. Int J Environ Res Public Health. 2021;18:1325.
13. Patel H, Shepherd TA. Online health information-seeking behaviours for low back pain in the United Kingdom: analysis of data from Google Trends and the Global Burden of Disease Study, 2004-2019. Int Health. 2025;17:71-6.
14. Szilagyi IS, Ullrich T, Lang-Illievich K, Klivinyi C, Schittek GA, Simonis H, et al. Google Trends for pain search terms in the world's most populated regions before and after the first recorded COVID-19 case: infodemiological study. J Med Internet Res. 2021;23:e27214.
15. Gündüz Başçıl S, Meşe S. Determining the interest in pain and analgesic during and before the COVID-19 pandemic period using Google Trends data: an infodemiological study. J Contemp Med. 2022;12:949-58.
16. Esen MF. COVID-19 salgınıyla ilişkili semptomların Türkiye'den gerçekleştirilen internet arama motoru sorgularının incelenmesi. J Med Palliat Care. 2021;2:7-14.
17. Güneş G, Sadık E, Ünal Erzurumlu Z. "Dr. Google, I have a toothache": assessment of the impact of COVID-19 pandemic on toothache-related internet searches with Google Trends data. Curr Res Dent Sci. 2025;35:117-20.
18. Erdem Sultanoğlu T, Ataoğlu S. COVID-19 pandemisi döneminde romatizmal hastalıklara halkın ilgisi: Google Trends verilerinin analizi. Saglik Bilimlerinde Deger. 2022;12:147-51.