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Original Article

Search trends of orthopedic terms in Turkey: a five-year time series analysis based on Google Trends

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Abstract

Background: This study aimed to analyze digital search trends related to ten commonly used orthopedic terms in Turkey using Google Trends data. The objective was to investigate temporal variations and seasonal patterns in public interest regarding orthopedic health topics. **Methods:** Weekly search data from the Turkish region between May 2020 and May 2025 were obtained via Google Trends. The analyzed terms included meniscus, scoliosis, trigger finger, anterior cruciate ligament, hallux valgus, knee arthroplasty, hip arthroplasty, heel spur, carpal tunnel syndrome and tendinitis. Using the Python programming language, time series analyses were conducted to identify seasonal trends and peak search weeks. **Results:** The terms scoliosis and heel spur demonstrated the highest search popularity. Notably, scoliosis-related searches peaked during the summer months, while heel spur queries increased during the autumn. An upward trend in searches for sports related terms such as meniscus was observed during late summer and early fall. Conversely, search volumes for knee and hip arthroplasty, conditions typically associated with older age groups, remained relatively low, potentially reflecting lower digital health literacy among the elderly. Trigger finger was identified as the term with the lowest overall search popularity. **Conclusions:** Digital search behaviors related to orthopedic terms in Turkey exhibit temporal variation and seasonal patterns. These findings may inform the timing and strategic planning of public health awareness campaigns. Digital data sources such as Google Trends may serve as effective tools in health communication and digital epidemiology.

Keywords: Orthopedic terms, orthopedic health, Google Trends, digital information seeking

Introduction

The integration of digital technologies into the healthcare domain has profoundly transformed the way individuals access medical information [1]. Today, the internet particularly search engines has become the most utilized source for obtaining information about diseases, treatment options, and healthcare services [1]. Google Trends is an open-access tool that analyzes users' search activity over a specified time frame, providing visualized insights into public information seeking behaviors [2]. This tool is frequently employed in the field of digital epidemiology and offers a means to monitor the temporal and spatial dynamics of public health concerns and awareness levels [2,3].

Orthopedic conditions are among the most prevalent health problems in the general population, significantly impacting individuals quality of life [4]. Joint disorders, musculoskeletal diseases, and degenerative processes contribute to substantial functional impairment and healthcare demand across both elderly and younger populations [4]. In this context, monitoring public interest in orthopedic terminology through digital platforms can provide valuable insights for assessing awareness levels, developing health communication strategies, and designing targeted public education campaigns [5].

In the present study, search trends related to ten frequently encountered orthopedic terms in Turkey meniscus, scoliosis, trigger finger, anterior cruciate ligament, hallux valgus, knee

arthroplasty, hip arthroplasty, heel spur, carpal tunnel syndrome and tendinitis were analyzed using Google Trends data. Time series data collected between May 2020 and May 2025 were evaluated in terms of seasonality, peak interest periods, and interterm comparisons. The findings are intended to contribute to public health policy development and digital health strategy planning.

Materials and methods

This study was designed as a retrospective, descriptive time-series analysis aimed at investigating the digital health information-seeking behaviors of the general population in Turkey with respect to commonly used orthopedic terminology. The primary data source was Google Trends, an open-access web analytics platform that provides normalized relative search interest scores, scaled from 0 to 100, based on the volume of searches conducted within a specified time frame and geographic location. Weekly search volume data were retrieved using a geographic filter for Turkey, covering the period from May 2020 to May 2025. A total of ten orthopedic terms were selected based on their prevalence in clinical practice, public health relevance, and frequency in the literature: meniscus, scoliosis, trigger finger, anterior cruciate ligament (ACL), hallux valgus, knee arthroplasty, hip arthroplasty, heel spur, carpal tunnel syndrome and tendinitis. Each term was queried independently, and corresponding relative popularity indices were obtained from Google Trends on a weekly basis.

It is important to note that the data retrieved from Google Trends represent relative search interest rather than absolute search volumes. Furthermore, since each term is normalized within its own dataset, direct numerical comparisons across terms are inherently limited and should be interpreted with caution.

Data processing and analytical procedures were performed using Python version 3.11. The pandas library was employed for data structuring and cleaning, with datasets transformed into long format time series. Missing values were assessed and appropriately managed. Seasonal trends and temporal dynamics were evaluated using the statsmodels and seabornlibraries. Time series visualizations, including line graphs, were generated using matplotlib and seaborn to illustrate term-specific search trends over time.

For each term, the following steps were performed:

- Weekly fluctuations in search interest were examined throughout the study period;
- Monthly average scores were calculated to detect seasonal variations in search behavior;
- Peak weeks, defined as the highest relative interest values (i.e., normalized to 100), were identified and presented in tabular format.

As the study exclusively utilized anonymized, publicly available open source data, and did not involve human participants or personal information, ethical approval was not required in accordance with institutional and international guidelines.

Results

The time-series analysis based on Google Trends data revealed the temporal distribution of weekly search interest for each orthopedic term over the study period (Figure 1). Among all investigated terms, “scoliosis” consistently demonstrated the highest level of relative popularity, markedly surpassing all other terms. A notable seasonal surge in scoliosis-related searches was observed during the summer months. This pattern is likely attributable to increased parental recognition of postural abnormalities in school- aged children during extended school breaks. Similarly, search interest for “heel spur” and “meniscus” exhibited distinct peaks during the spring and summer seasons. These fluctuations may be associated with heightened physical activity levels during warmer months, potentially leading to increased awareness or incidence of conditions such as plantar fasciitis and meniscal injuries.

Table 1. Highest search date and popularity value for each term.

Search Term	Summit Week	Popularity
Scoliosis	21.06.2020	100
Heel spur	10.09.2023	100
Meniscus	23.07.2023	80
Carpal tunnel syndrome	24.11.2024	33
Anterior cruciate ligament injury	20.10.2024	27
Tendinitis	08.12.2024	19
Hallux valgus	02.03.2025	15
Hip arthroplasty	04.12.2022	15
Knee arthroplasty	16.10.2022	14
Trigger finger	14.05.2023	8

In contrast, terms such as “anterior cruciate ligament”, “carpal tunnel syndrome”, and “tendinitis” displayed moderate levels of variability throughout the year, without pronounced seasonal clustering. Meanwhile, search volumes for terms related to older adult populations namely “hallux valgus”, “knee arthroplasty”, and “hip arthroplasty” remained relatively low across the entire study period. This trend may reflect a lower propensity among older individuals to seek health related information through digital platforms.

The monthly average popularity values reveal the seasonal trends associated with the search terms (Figure 2). Searches for scoliosis demonstrate a marked increase during the months of June and July, while remaining relatively low throughout the rest of the year. The terms heel spur and meniscus reach higher average search volumes particularly in the spring and autumn months, reflecting the influence of seasonal variations in physical activity levels. Due to the nature of sports-related injuries, the popularity of terms such as anterior cruciate ligament (ACL) and meniscus tends to rise during the late summer and autumn period. Conversely, terms associated with older age groups, such as knee arthroplasty and hip arthroplasty, exhibit minimal seasonal fluctuation, suggesting a more stable pattern in online health information seeking behavior among this demographic. The distinctiveness of seasonal patterns provides valuable insights for optimizing the timing of public health information and awareness campaigns. The peak search week and corresponding relative popularity score for each orthopedic term are presented (Table 1).

Scoliosis and heel spur were the only two terms that reached the maximum popularity score of 100, highlighting their prominent position in public digital health information seeking behavior. The peak in scoliosis interest, occurring during the week of June 21, 2020, may be associated with heightened parental awareness during the summer period and potentially with awareness campaigns disseminated through the media. In contrast, the peak

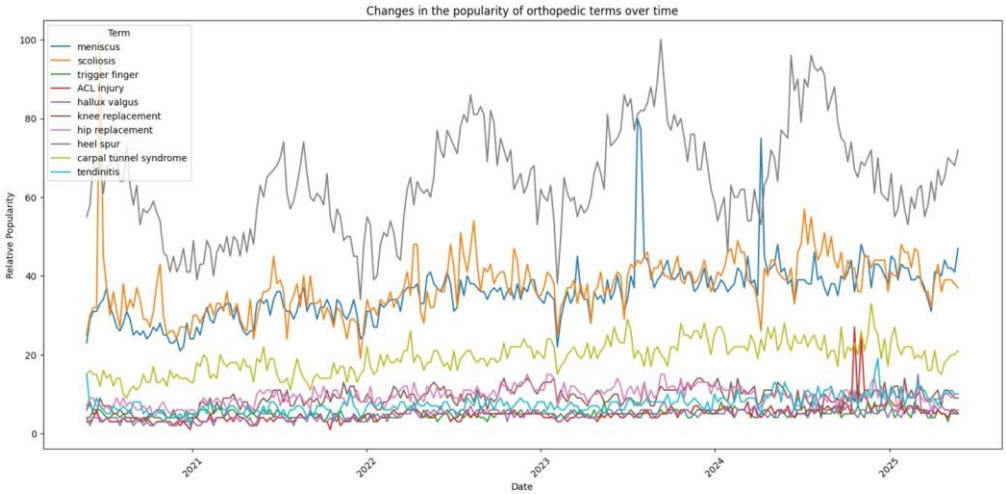

Figure 1. Trends in popularity of terms over time.

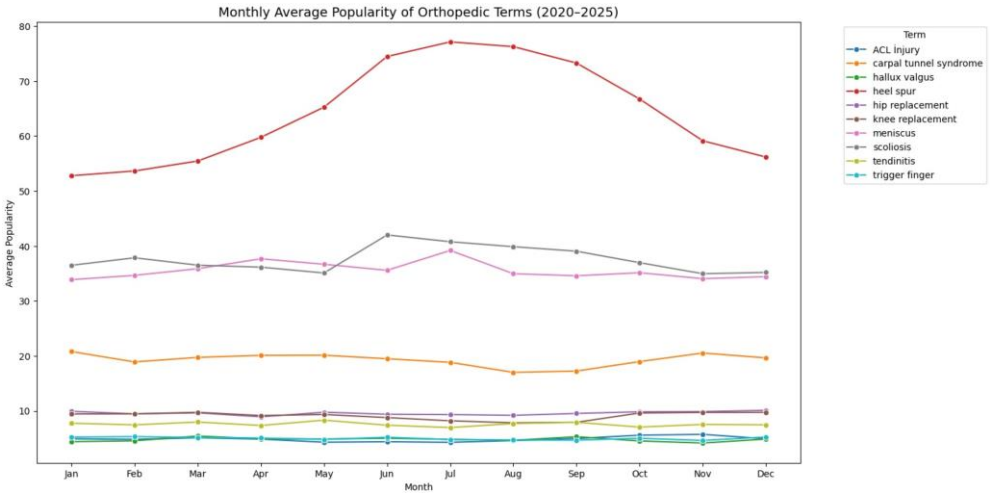

Figure 2. Monthly average popularity values show seasonal trends of terms.

interest in heel spur during the week of September 10, 2023, may reflect an increase in pain complaints related to walking, physical activity, and occupational strain typical of early autumn.

The term meniscus demonstrated considerable search intensity, peaking at a score of 80 in the week of July 23, 2023, likely reflecting sports-related knee injuries commonly occurring during summer months. Meanwhile, terms such as carpal tunnel syndrome, anterior cruciate ligament (ACL), and tendinitis received more moderate attention (with peak scores of 33, 27, and 19, respectively). Although linked to occupational and athletic activity, these conditions may involve narrower population segments, resulting in comparatively lower search volumes.

Terms typically associated with degenerative or surgical conditions such as hallux valgus, hip arthroplasty and knee arthroplasty showed relatively low popularity scores (15, 15, and 14, respectively). This may be attributed to the lower digital engagement of older individuals or may indicate that information-seeking on these topics predominantly occurs during in person clinical consultations. Notably, the term trigger finger ranked lowest, with a peak score of only eight, suggesting minimal public awareness of this condition.

In summary, the data presented in Table 1 provide valuable insights into which orthopedic conditions attract greater public attention online and the specific time periods during which interest intensifies. These findings may inform the development and timing of targeted health communication strategies.

Discussion

The findings of this study indicate that information-seeking behaviors related to orthopedic health topics in Turkey fluctuate over time and tend to intensify during specific periods. In this context, Google Trends serves as a powerful tool for monitoring digital health trends and developing strategies that align with the public's evolving informational needs. Incorporating digital information-seeking patterns into healthcare planning may facilitate the implementation of timely, needs based interventions [2].

The observed peak in scoliosis-related search activity during the summer months may be attributed to increased parental awareness of postural abnormalities in school-aged children during this period. The reduced use of school uniforms and more frequent observation of children at home may facilitate the recognition of spinal deformities. Previous studies have reported that conducting scoliosis screening campaigns during summer leads to higher diagnostic detection rates [6]. Therefore, aligning public health education initiatives with school holidays may promote earlier diagnosis and intervention.

Similarly, the seasonal increase in search interest for heel spur and meniscus-related terms during the spring and autumn months may be linked to higher levels of physical activity during these transitional periods. Outdoor exercises such as walking and recreational sports tend to increase during these seasons, which can trigger overuse syndromes such as plantar fasciitis. This seasonal pattern is supported by epidemiological data reporting increased rates of sports-related injuries in warmer months [7].

In contrast, search volumes for conditions predominantly affecting older adults, such as knee and hip arthroplasty, remain comparatively low. This trend may be linked to the lower engagement of elderly individuals with digital platforms. Indeed, previous research has demonstrated that digital health literacy among older adults is significantly lower than that of younger populations [8]. In this regard, it is essential to develop strategies aimed at improving access to digital health resources for the elderly.

While Google Trends does not provide direct data on disease prevalence, it serves as a valuable proxy for public awareness, concern, and information seeking behaviors related to health [9]. The insights gained through this analysis can be effectively used to guide the timing and content of public health awareness campaigns. For instance, educational initiatives on scoliosis could be strategically planned for the summer months, whereas campaigns addressing heel spur and sports injuries might be more effective if concentrated during the spring season.

A major limitation of this study is that the Google Trends data do not directly reflect actual patient numbers. The platform provides normalized values indicating relative public interest in specific terms, rather than absolute search volumes or clinical prevalence. Moreover, due to the normalization process, quantitative comparisons between different terms should be interpreted with caution. Therefore, the results should be viewed primarily as indicators of public awareness and digital health information-seeking behavior, rather than as direct proxies for disease incidence.

Conclusions

This study demonstrates that digital search behaviors related to commonly encountered orthopedic terms in Turkey exhibit temporal variability. Scoliosis and heel spur emerged as the terms with the highest search volumes, while seasonal analyses revealed increased search intensity particularly during the summer and spring months. These findings offer insights into public health awareness and suggest that digital data can be effectively leveraged in public health policy-making and health communication strategies. Information-seeking related to orthopedic conditions appears to be shaped by seasonal or period specific needs. Recognizing these patterns may enhance the effectiveness of targeted educational and intervention efforts. The use of digital data sources such as Google Trends may serve as a valuable component of digital epidemiology and can be integrated effectively into public health strategies.

Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by ÖLK, MK, TÖ, AA, AÖ. The first draft of the manuscript was written by OLK and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical statement

As the study exclusively utilized anonymized, publicly available open source data, and did not involve human participants or personal information, ethical approval was not required in accordance with institutional and international guidelines.

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