



Academic Productivity and Trends in Anesthesia Research in Türkiye: A Bibliometric Perspective (1981-2024)

Anestezi Araştırmalarında Akademik Verimlilik ve Yönelimler: Türkiye'den Bir Bibliyometrik Perspektif (1981-2024)

¹ Gözde ALTUN¹, ² Barış SANDAL², ³ Ayla ESİN¹, ⁴ Yasemin ÖZŞAHİN¹, ¹ Kerem ERKALP¹, ³ ZİYA SALİHOĞLU³,
⁴ Ece SALİHOĞLU⁴

¹İstanbul University-Cerrahpaşa, Institute of Cardiology, Department of Anesthesiology and Reanimation, İstanbul, Türkiye

²İstanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Engineering, Department of Mechanical Engineering, İstanbul, Türkiye

³İstanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Anesthesiology and Reanimation, İstanbul, Türkiye

⁴Nişantaşı University Faculty of Medicine, Department of Cardiovascular Surgery, İstanbul, Türkiye

ABSTRACT

Objective: The field of anesthesiology in Türkiye has witnessed a significant increase in academic productivity over the past decades. Bibliometric analyses provide a quantitative evaluation of research output, publication trends, and emerging topics in a specific discipline. This study aims to conduct a comprehensive bibliometric analysis of anesthesiology publications in Türkiye from 1981 to 2024.

Methods: Data were retrieved from the Web of Science Core Collection, focusing on publications indexed in the Science Citation Index Expanded and Emerging Sources Citation Index. The search was conducted using the terms “anesthesia” or “anaesthesia” under the anesthesiology category. The analysis included 2,768 publications, consisting of original articles, letters, reviews, and editorial materials. Performance analysis, keyword co-occurrence mapping, citation analysis, and trend topic identification were conducted using VOSviewer and SPSS. Predictive modeling estimated the projected publication trends over the next five years.

Results: The number of anesthesiology-related publications in Türkiye has steadily increased, with open-access publications accounting for 42.63% of the total. Regional anesthesia, postoperative pain management, and multimodal analgesia emerged as dominant research topics in cluster analyses. İstanbul University ranked first in publication output (19%), reflecting the impact of

ÖZ

Amaç: Türkiye’de anesteziyoloji alanı son yıllarda akademik üretkenlikte önemli bir artışa tanık olmuştur. Bibliyometrik analizler, belirli bir disiplindeki araştırma çıktısının, yayın eğilimlerinin ve yeni ortaya çıkan konuların nicel bir değerlendirmesini sağlar. Bu çalışmanın amacı, 1981-2024 yılları arasında Türkiye’deki anesteziyoloji yayınlarının kapsamlı bir bibliyometrik analizini yapmaktır.

Yöntemler: Veriler Web of Science Core Collection’den alınmış, Science Citation Index Expanded ve Emerging Sources Citation Index indekslerinde taranan yayınlara odaklanılmıştır. Arama, anesteziyoloji kategorisi altında “anesthesia” veya “anaesthesia” terimleri kullanılarak gerçekleştirilmiştir. Analize orijinal makaleler, mektuplar, derlemeler ve editöryal materyallerden oluşan 2,768 yayın dahil edilmiştir. Performans analizi, anahtar kelime eş-oluşum haritalaması, atıf analizi ve trend konu tanımlaması VOSviewer ve SPSS kullanılarak gerçekleştirilmiştir. Tahmine dayalı modelleme, önümüzdeki beş yıl içinde öngörülen yayın eğilimlerini tahmin etmiştir.

Bulgular: Türkiye’de anesteziyoloji ile ilgili yayınların sayısı istikrarlı bir şekilde artmıştır ve açık erişimli yayınlar toplamın %42,63’ünü oluşturmaktadır. Bölgesel anestezi, postoperatif ağrı yönetimi ve multimodal analjezi, küme analizlerinde baskın araştırma konuları olarak ortaya çıkmıştır. İstanbul Üniversitesi,

Address for Correspondence: Gözde Altun MD, İstanbul University-Cerrahpaşa, Institute of Cardiology, Department of Anesthesiology and Reanimation, İstanbul, Türkiye

E-mail: gozde.altun@iuc.edu.tr

ORCID IDs of the authors: G.A.: 0000-0002-6025-944X, B.S.: 0000-0003-1078-7786, A.E.: 0000-0003-1168-9635, Y.Ö.: 0000-0002-8653-2272, K.E.: 0000-0002-4025-7092, Z.S.: 0000-0002-6905-2664

Cite this article as: Altun G, Sandal B, Esin A, Özşahin Y, Erkalp K, Salihoğlu Z. Academic productivity and trends in anesthesia research in Türkiye: a bibliometric perspective (1981-2024). Bezmialem Science.

Received: 19.03.2025

Accepted: 25.07.2025

Epub: 15.09.2025



©Copyright 2025 by Bezmialem Vakıf University published by Galenos Publishing House.
Licenced by Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0)

institutional history on scientific contributions. Statistical analyses demonstrated a significant positive correlation between faculty age and publication volume ($r=0.659$, $p=0.008$). Predictive modeling suggested continued growth in research output.

Conclusion: This bibliometric analysis highlights Türkiye's increasing contribution to global anesthesiology research, with growing interest in perioperative pain management and regional anesthesia techniques. The findings offer valuable insights for academics and funding agencies to shape future research priorities and foster international collaboration.

Keywords: Anesthesia, anesthesiology, bibliometric analysis, VOSviewer, citation analysis

kurumsal tarihin bilimsel katkılar üzerindeki etkisini yansıtan yayın çıkışında (%19) ilk sırada yer almıştır. İstatistiksel analizler, fakülte yaşı ile yayın hacmi arasında anlamlı bir pozitif korelasyon olduğunu göstermiştir ($r=0,659$, $p=0,008$). Tahmine dayalı modelleme, araştırma çıktılarındaki büyümenin devam edeceğini göstermiştir.

Sonuç: Bu bibliyometrik analiz, perioperatif ağrı yönetimi ve rejyonel anestezi tekniklerine artan ilgiyle birlikte Türkiye'nin küresel anesteziyoloji araştırmalarına artan katkısını vurgulamaktadır. Bulgular, gelecekteki araştırma önceliklerini şekillendirmek ve uluslararası işbirliğini teşvik etmek için akademisyenler ve fon sağlayan kuruluşlar için değerli bilgiler sunmaktadır.

Anahtar Kelimeler: Anestezi, anesteziyoloji, bibliyometrik analiz, VOSviewer, atıf analizi

Introduction

In recent years, academic productivity and publication activities in the field of anesthesiology in Türkiye have increased in both quantity and diversity. Similar to other medical disciplines, academics in anesthesiology publish scientific studies to establish scientific communication with colleagues, share research findings, and present new ideas (1). Regardless of the purpose, every academic publication contributes to the existing literature, leaving a lasting impact.

Various associations and organizations related to anesthesia undertake initiatives to advance anesthesiology and foster its academic growth (2). These efforts strengthen the foundation of scientific publishing, support the dissemination of innovations, and contribute to the production of new research. Additionally, they help identify “outdated” methods and knowledge, enabling the development of novel and innovative approaches (3).

Numerous shared databases have been established to facilitate the dissemination of scientific publications. These databases facilitate shared access to scientific publications across countries and institutions, enhancing accessibility and promoting collaboration. However, the increasing volume of publications within these databases presents challenges for academics in conducting targeted searches and efficiently accessing relevant sources. Although various databases have been established and keyword-based searches are possible, reaching key publications can still be difficult at times (4).

Bibliometric analyses can serve as a guiding tool for academics in this regard. These analyses focus on statistically examining publications within a specific scientific field and time frame, as well as the relationships between them (5). By utilizing bibliometric methods, researchers can gain insights into current trends and future research directions through keyword analysis. Furthermore, bibliometrics helps identify emerging trends in a given field, enabling authors to better understand and align with existing and prospective research trajectories (6,7).

Anesthesiology is a multidisciplinary field that encompasses anesthesia management along with the subspecialties of pain medicine and critical care, making it a highly comprehensive

discipline. Consequently, the volume of data within relevant databases is substantial. This study aims to systematically analyze anesthesiology research contributions from Türkiye to the global literature, highlight key aspects, and provide insights for academics to guide future research directions. This study presents a comprehensive bibliometric analysis of anesthesia-related publications from Türkiye between 1981 and 2024. By utilizing data from the Web of Science (WoS) Core Collection, the research systematically examines publication trends, citation impact, institutional contributions, and thematic developments in the field. The analysis employs bibliometric mapping techniques such as keyword co-occurrence, citation network analysis, and trend analysis to identify key research areas and evolving scientific interests. The main aim is to provide an in-depth evaluation of Türkiye's academic output in anesthesiology, highlighting its contributions to global literature while offering insights into emerging research trends. This study also can serve as a valuable resource for researchers and academic institutions in shaping future research strategies and fostering scientific collaboration in the field of anesthesiology.

Methods

Ethics Statement

As this study is a bibliometric analysis based on published literature, ethics committee approval was not required. Information has been provided to the ethics committee only through an official letter.

Study Design

This is a bibliometric study that systematically analyzes publications in the field of anesthesiology to identify research trends, active institutions and conceptual structures. The study employs performance analysis and science mapping techniques to evaluate the evolution of research themes and contributions to the field.

Data Source and Search Strategy

Data were retrieved from the WoS Core Collection (WoS by Clarivate Analytics), with a focus on publications indexed in the Science Citation Index Expanded (SCIE) and Emerging

Sources Citation Index (ESCI). The search was conducted on December 6, 2024, and included articles published between 1981 and 2024. The search terms used were “anesthesia” or “anaesthesia”, and the results were filtered to include only studies affiliated with institutions in Türkiye or Turkey under the ANESTHESIOLOGY category.

A total of 2,819 publications were identified. After excluding 51 publications categorized as proceedings papers and other document types such as meeting abstracts, book chapters, retracted articles, corrections, and discussion notes, a total of 2,768 documents (original articles, letters, reviews, and editorial materials) were included in the final analysis.

The WoS Core Collection (SCIE and ESCI) was selected as the sole data source due to its rigorous journal inclusion standards, peer-reviewed and curated content, and structured metadata that is compatible with advanced bibliometric tools. Although databases such as Scopus offer broader journal coverage, previous research has demonstrated that bibliometric indicators obtained from WoS and Scopus are highly correlated at the national and disciplinary levels (8). Using a single consistent data source minimizes heterogeneity and enhances the reproducibility and internal consistency of the analysis.

Statistical Analysis

The bibliometric analysis involved several key methodologies. Performance analysis was conducted to evaluate the number of publications per year, document types, and citation metrics.

To explore relationships within the dataset, science mapping techniques such as keyword co-occurrence and citation network analyses were performed using VOSviewer (version 1.6.18, Leiden University, Netherlands). Trend topic analysis was utilized

to examine the evolution of research themes over different time periods in anesthesiology. Furthermore, institutional contributions were assessed by identifying the most active institutions based on publication count and citation impact. Cluster analysis was conducted on keyword networks to identify major research clusters and thematic developments. Additionally, a co-citation analysis was performed to determine the most influential articles and journals within the dataset.

To ensure the consistency and reliability of the dataset, duplicate records were identified and removed using DOI matching and title-author similarity. Early access and final-version duplicates were carefully screened. Institutional names were standardized manually for high-frequency organizations to merge known variants (e.g., abbreviation vs. full name, Turkish vs. English spelling). Additionally, VOSviewer’s thesaurus file was applied to unify author and affiliation name variants during network visualizations.

Additionally, statistical analyses were conducted using SPSS (version 29.0, IBM, Chicago, IL, USA), including descriptive statistics, regression and correlation analyses to evaluate trends within the dataset. SPSS was also utilized for predictive modeling to estimate the number of publications expected over the next five years based on historical trends.

Results

In the literature reviewed, the data of the articles included in the study are given in the flow chart (Figure 1).

As a result of a comprehensive literature review, a total of 2,819 publications on anesthesia were identified in the WoS Core Collection (SCI and ESCI) between 1981 and 2024 (Table 1).

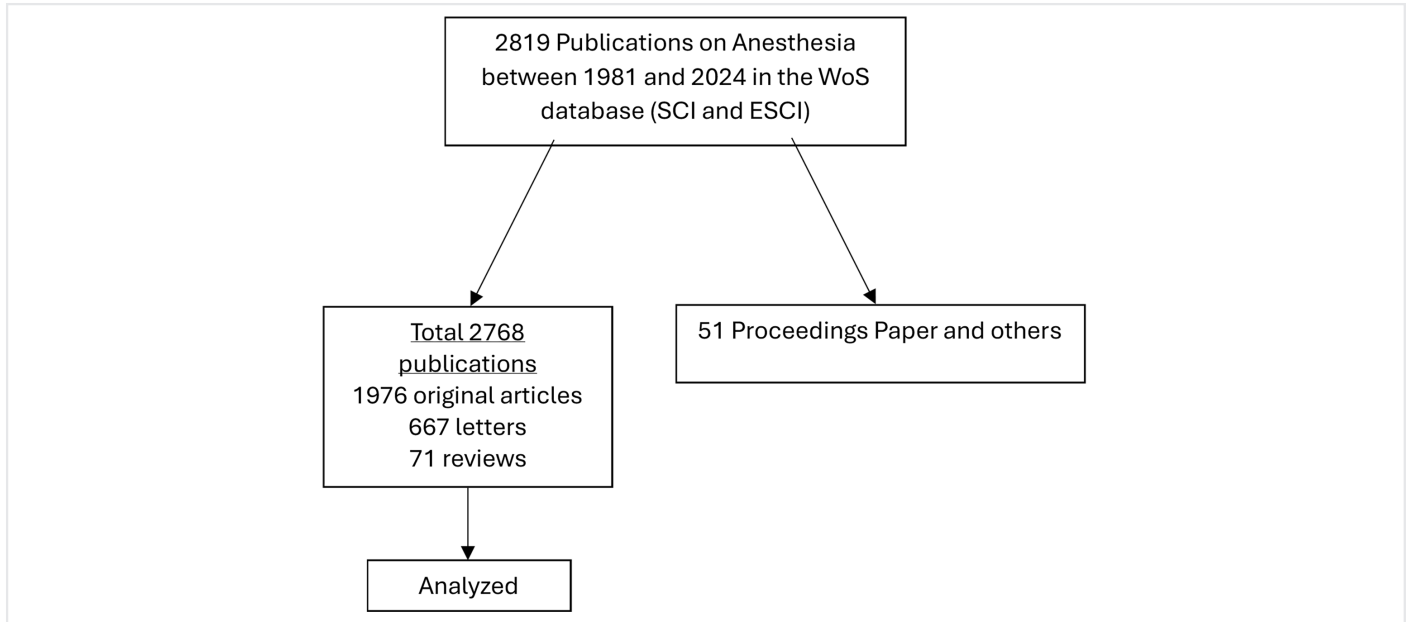


Figure 1. Flow chart of the bibliometric analysis
ESCI: Emerging Sources Citation Index

Among the 2,768 publications, 71.39% (n=1,976) were articles, 24.10% (n=667) letters, 2.57% (n=71) reviews, and 1.95% (n=54) editorial materials. The total number of citations for all document types was 36,280, with an average citation per document of 13.11 (Table 2).

In terms of indexing, 78.68% (n=2,178) of the publications were indexed in the SCIE, while 21.32% (n=590) were in the ESCI. The citation count in the SCIE index was 34,154 (15.68 citations/document), whereas ESCI-indexed papers had 2,126 citations (3.60 citations/document) (Table 3).

Among the 2,768 analyzed publications, 42.63% (n=1,299) were published as open access, reflecting the global trend toward wider dissemination of scientific knowledge.

The Gold Open Access category, which includes fully open-access journals, accounted for 19.53% (n=595) of the publications. A smaller portion of publications, 0.66% (n=20), was classified as Gold-Hybrid Open Access, indicating articles made openly accessible within subscription-based journals. Additionally, 18.18% (n=554) of the publications were categorized as Free to Read, referring to articles made available without paywall restrictions, though not necessarily published under open-access policies. The Green Open Access model, which allows authors to share versions of their work through institutional repositories, accounted for 19.00% (n=579) of the publications. In the Clarivate classification, OA subcategories may overlap; therefore, their subtotals should not be arithmetically summed with the "All Open Access" category. (Table 4).

The bibliometric analysis of 2,768 anesthesia-related publications identified the most active journals contributing to the field. These journals vary in terms of quartile ranking (Q1-Q4), citation impact, and research focus, reflecting their

influence on the dissemination of anesthesia research (Table 5). Among the leading journals, Q1-ranked journals accounted for a significant proportion of high-impact publications. The Journal of Clinical Anesthesia (Q1, n=339) was the most frequently used journal, accumulating 4,797 citations, with an average of 14.15 citations per document. Other notable Q1-ranked journals included Anesthesia & Analgesia (n=188, 4,617 citations, avg. 24.56 citations/document) and the European Journal of Anaesthesiology (n=179, 3,539 citations, avg. 19.77 citations/document). Q2-ranked journals, including Pediatric Anesthesia (n=204, 2,586 citations, avg. 12.68 citations/document) and the Journal of Cardiothoracic and Vascular Anesthesia (n=164, 2,419 citations, avg. 14.75 citations/document), also played a substantial role in anesthesia research dissemination. The Turkish Journal of Anaesthesiology and Reanimation (Q3, n=298) was among the most frequently used journals in the dataset, though its average citation per document (3.62 citations) was lower compared to high-impact international journals. A notable contribution from Q4-ranked journals was observed, particularly in Revista Brasileira de Anestesiologia (n=161, 1,242 citations, avg. 7.71 citations/document), reflecting its regional importance in anesthesia research. Collectively, the top 10 journals accounted for 1,889 publications (66.91% of the total), accumulating 25,059 citations. The remaining 54 journals collectively published 916 publications, receiving 11,221 citations (avg. 12.25 citations/document).

The analysis of anesthesia-related publications revealed that 15 research universities with medical faculties played a significant role in the scientific output of Türkiye. These universities collectively contributed 1,272 publications, representing a substantial share of the total 2,768 analyzed publications (45.96%) (Table 6). Among the leading institutions, İstanbul

Table 1. Types of publications [count/percentage (%)]

Document types	Count	Percentage (%)
Article	1,976	70.10
Letter	667	23.66
Review	71	2.52
Editorial material	54	1.92
Proceedings paper and others	51	1.81
Total	2,819	100

Table 2. Number and citations of the publications [count/percentage (%)]

Document types	Count	Percentage (%)	Citations (WoS)	Citation/count
Article	1,976	71.39	31,945	16.17
Letter	667	24.10	3,098	4.64
Review	71	2.57	1,074	15.13
Editorial material	54	1.95	163	3.02
Total	2,768	100.00	36,280	13.11

WoS: Web of science

Table 3. Citation count and indexing of the publications [number, percentage (%)]

Index	Count	Percentage	Citations (WoS)	Citation/Count
Science Citation Index Expanded (SCIE)	2,178	78.68	34,154	15.68
Emerging Sources Citation Index (ESCI)	590	21.32	2,126	3.60
Total	2,768	100.00	36,280	13.11

WoS: Web of Science

Table 4. Open Access models of the publications [number, percentage (%)]

Open access	Document count	Percentage
All open access	1,299	42.63
Gold	595	19.53
Gold-hybrid	20	0.66
Free to read	554	18.18
Green published	579	19.00

University (n=236, 19.05%) emerged as the most productive, followed by Atatürk University (n=134, 10.82%), Hacettepe University (n=141, 11.38%), and İstanbul University-Cerrahpaşa (n=124, 10.01%). Other notable contributors included Gazi University (n=107, 8.64%), Çukurova University (n=59, 4.76%), Dokuz Eylül University (n=78, 6.30%), Ege University (n=47, 3.79%), and Marmara University (n=62, 5.00%). Additionally, Koç University (n=32, 2.58%), despite being a relatively newer institution (established in 2009), has established itself as a key player in anesthesia research. In contrast, seven research universities were excluded from the analysis due to the absence of a medical faculty. These included Boğaziçi University, Gebze Technical University, İhsan Doğramacı Bilkent University, İstanbul Technical University, İzmir Institute of Technology, Middle East Technical University, and Sabancı University.

A statistical analysis was conducted to examine the relationship between faculty age and publication count among the 15 research universities included in the study. The Pearson correlation analysis revealed a significant positive correlation ($r=0.659$, $p=0.008$), suggesting that as faculty age increases, the number of anesthesia-related publications also tends to rise. A linear regression analysis was performed to further explore this relationship, with faculty age as the independent variable and publication count as the dependent variable. The regression model was statistically significant [$F(1,13)=9.958$, $p=0.008$] and explained 43.4% ($R^2=0.434$) of the variance in publication count. The unstandardized regression coefficient for faculty age was $b = 2.125$, 95% CI (0.670, 3.580), $p = 0.008$, indicating that for each additional year in faculty age, the predicted number of publications increases by approximately 2.125 units. The regression equation derived from this model is given by Equation (1)

$$\text{publication count} = -32.312 + (2.125 \times \text{faculty years}) \quad (1)$$

Table 5. Journals with the most publications [number, percentage (%)]

Journals with the most publications (Top 10)	Quartile	Document count	Citation (WoS)	Average citation per document
Journal of Clinical Anesthesia	Q1	339	4,797	14.15
Turkish Journal of Anaesthesiology and Reanimation	Q3	298	1,080	3.62
Pediatric Anesthesia	Q2	204	2,586	12.68
Anesthesia & Analgesia	Q1	188	4,617	24.56
European Journal of Anaesthesiology	Q1	179	3,539	19.77
Journal Of Cardiothoracic and Vascular Anesthesia	Q2	164	2,419	14.75
Revista Brasileira de Anestesiologia	Q4	161	1,242	7.71
Journal of Anesthesia	Q2	139	1,727	12.42
Acta Anaesthesiologica Scandinavica	Q2	99	2,221	22.43
Minerva Anestesiologica	Q1	80	831	10.26
Others (54 Journals)		916	11,221	12.25
Total		2,768	36,280	13.11

WoS: Web of science

Table 6. Year of establishment and document count [number, percentage (%)]

Name	Year of establishment	Publication count	Percentage
İstanbul University	1933	236	19.05
Hacettepe University	1967	141	11.38
Atatürk University	1957	134	10.82
İstanbul University-Cerrahpaşa	1967	124	10.01
Gazi University	1979	107	8.64
Ankara University	1945	85	6.86
Dokuz Eylül University	1978	78	6.30
Marmara University	1983	62	5.00
Çukurova University	1972	59	4.76
Ege University	1955	47	3.79
Erciyes University	1978	46	3.71
Bursa Uludağ University	1970	37	2.99
Koç University	2009	32	2.58
Karadeniz Technical University	1973	31	2.50
Fırat University	1983	20	1.61

This trend is visually represented in the scatter plot with a fitted regression line, showing a clear upward trajectory in publication count as faculty age increases (Figure 2). İstanbul University, being one of the oldest institutions, had the highest publication output, whereas younger institutions such as Koç University exhibited lower publication numbers.

The estimation model results indicate a steady increase in the number of anesthesia-related publications in the coming years (Figure 3). Based on Holt's linear trend model, the forecasted publication counts for the period 2025–2029 are as follows:

- 2025: 123 publications (95% CI: 66-180)
- 2026: 128 publications (95% CI: 58-198)

- 2027: 133 publications (95% CI: 52-214)
- 2028: 138 publications (95% CI: 47-228)
- 2029: 142 publications (95% CI: 43-242)

A keyword analysis was conducted on the 2,768 anesthesia-related publications, revealing a total of 3,862 distinct keywords used across the dataset. The top 10 most frequently used keywords, each appearing more than 10 times, provide insights into the dominant research themes and trending topics in the field. The most frequently used keyword was “anesthesia” (n=128), followed by “propofol” (n=106), a widely used intravenous anesthetic agent. Postoperative pain (n=80) and postoperative

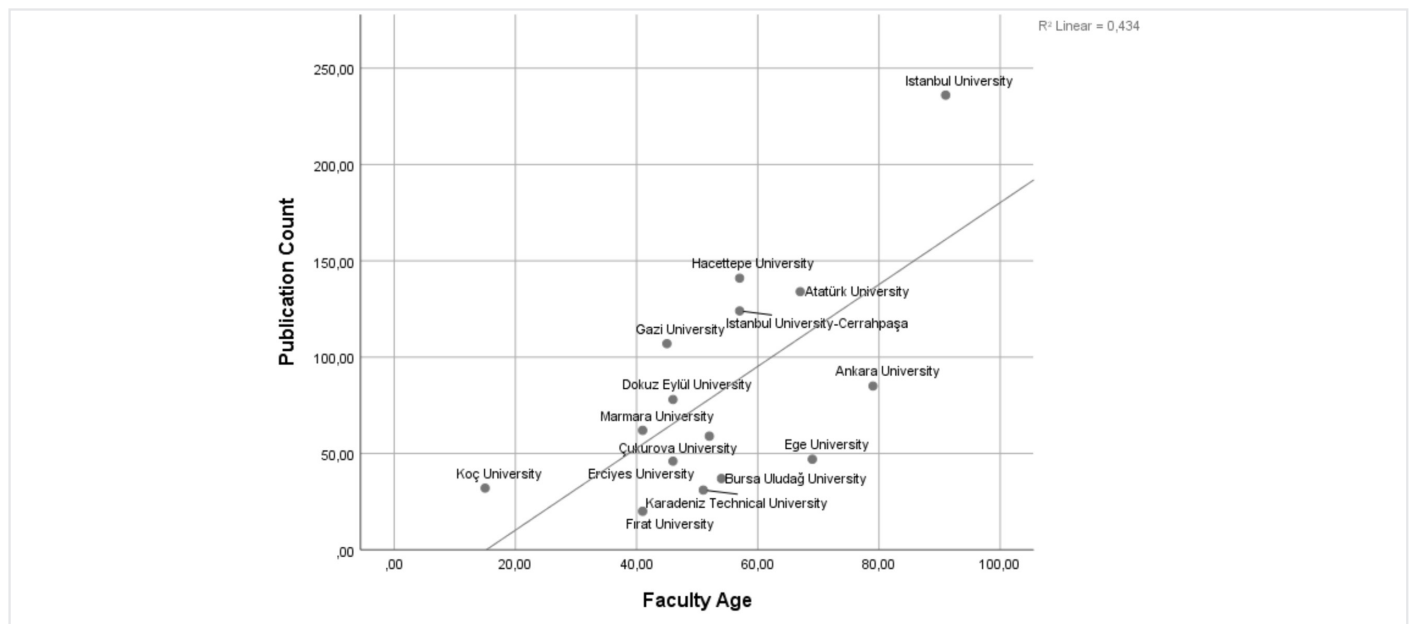


Figure 2. Correlation of faculty age and publication count

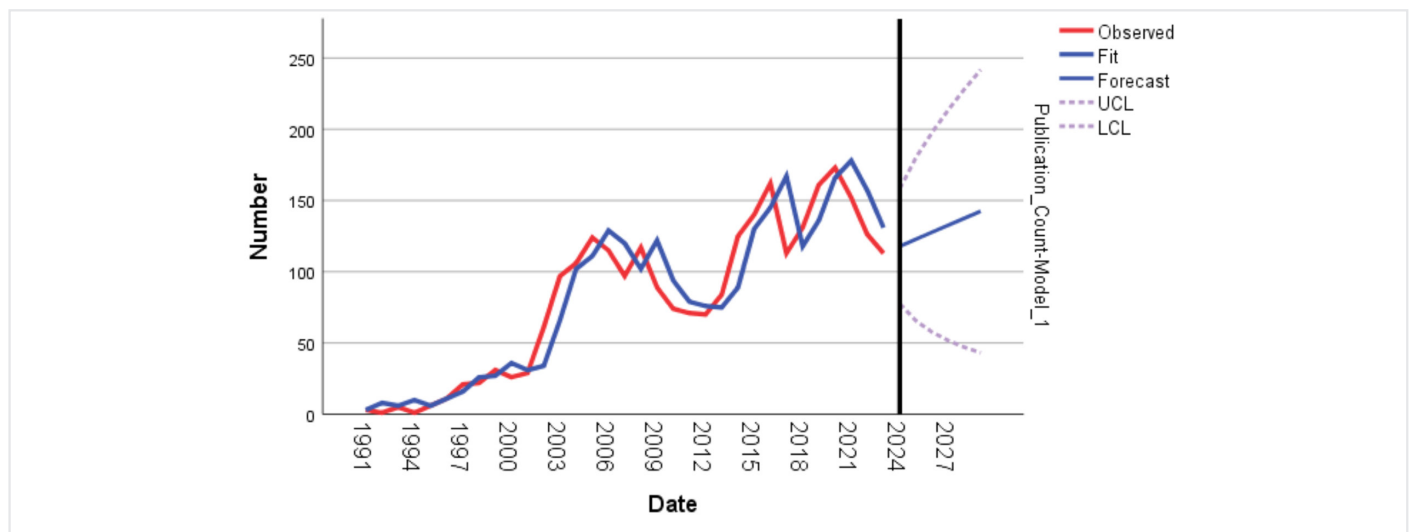


Figure 3. The estimation of number of anesthesia related publications in the coming years

analgesia (n=72) were also prominent topics, reflecting ongoing research interest in perioperative pain management strategies.

The word cloud visualization below illustrates the distribution of the most commonly used keywords in anesthesia-related publications (Figure 4).

The second network map (Figure 5) represents trending research topics over time, with color-coded keywords showing evolutionary patterns in anesthesia research.



Figure 4. Cloud visualization of the most commonly used keywords in anesthesia related publications

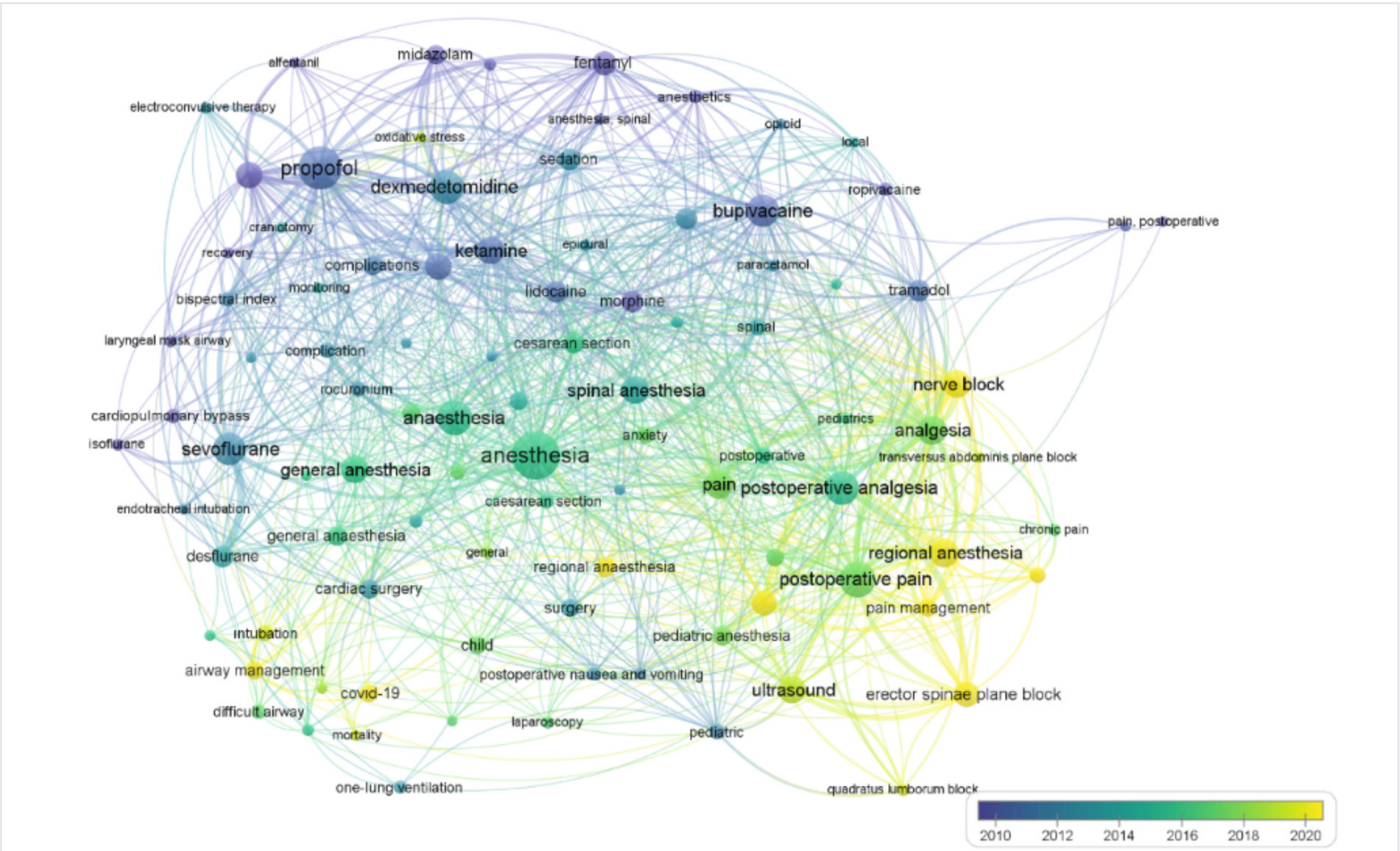


Figure 5. Research topics over time

Discussion

With advancing technology, the sharing and accessibility of information have become increasingly convenient worldwide. The growing exchange of knowledge has enriched the scientific literature. However, as the number of medical publications in scientific databases continues to rise, identifying targeted articles on a specific research topic has become more challenging (9). Several bibliometric analyses have been conducted on different methodologies used in anesthesiology in Türkiye (10-13). This study, however, presents a bibliometric analysis of scientific publications in the field of anesthesiology and reanimation in Türkiye between 1981 and 2024. By systematically reviewing existing research, this study aims to provide insights and guidance for future academic studies in the field.

In this study, the keywords “anesthesia” and “anaesthesia” were analyzed under the “anesthesiology” category. The analysis revealed that the majority of the publications consisted of research articles. It was also observed that Türkiye has contributed to the literature with original and high-quality research.

When evaluating the access types of published articles, a notable increase in “open-access” publications is observed. Open-access publishing allows academics and clinicians to access journal content without requiring a paid subscription. There are several types of open-access models, with the most prominent being “all open access,” “gold,” “gold-hybrid,” “free-to-read,” and “green published.” It has been noted that authors in Türkiye also utilize these alternatives to share their scientific research through open access.

This trend enhances accessibility to information in anesthesiology research and increases the visibility of scientific studies. As a result, it facilitates the globalization of knowledge, ensuring broader dissemination across the scientific community. Türkiye is also actively contributing to this global movement by aligning with international efforts to share scientific knowledge.

One of the key factors in achieving scientific prominence on a global scale is not only the quantity of scientific publications but also their quality. Countries that embrace this principle have contributed to the increase in the number of articles published in indexed journals within the field of anesthesiology (14). In a 2010 study by Bould et al. (15), which analyzed anesthesiology articles published in SCI journals from 23 countries, Türkiye ranked 7th with 127 publications. In our analysis, rather than making a country-by-country comparison, we aimed to present only Türkiye’s data. In this regard, it is evident that the number of publications from Türkiye in these journals has increased over time.

The analysis highlights that researchers seeking higher citation impact should prioritize Q1 and Q2-ranked journals, which not only publish a higher volume of anesthesia-related studies but also yield greater citation influence. Additionally, regional journals continue to play an important role in providing access to country-specific and clinical research findings, further enriching the global anesthesia literature.

In a 2017 study by Yılmaz et al. (16), it was found that the most frequently published articles appeared in the “European Journal of Anaesthesia” and the “Journal of Anesthesia”. In this study, the journal with the highest number of publications was the Journal of Clinical Anesthesia (n=339) (Table 5).

It has been observed that the older the faculties or research hospitals, the higher their scientific contribution in terms of publication volume. This can be attributed not only to their longstanding presence but also to their established academic and institutional collaborations, as well as their greater experience and expertise in conducting and publishing scientific research. Additionally, older universities have a well-established academic structure, making it easier for them to secure resources and funding. All these factors contribute to their higher publication output, explaining why older institutions tend to be more prolific in scientific publishing. In our study, İstanbul University, Türkiye’s oldest university, ranked first in annual publication output, supporting this observation. Additionally, in relatively younger universities, easier access to extensive resources in the field of anesthesiology has contributed to the rise of their academic productivity. As a result of our bibliometric analysis, projections have been made for future planning. According to these findings, if the same level of productivity continues, Türkiye is expected to maintain a steady increase in anesthesiology research output over the next five years beyond 2024, continually building upon its contributions each year.

In the forthcoming publications, the selection of appropriate keywords will be crucial to ensure that studies can be found quickly, easily, and in a targeted manner within databases. In our study, an analysis of anesthesiology-related keywords revealed that perioperative pain management topics are on the rise. This trend is likely associated with the increasing use of ultrasonography in anesthesiology, which has led to a wider adoption of peripheral nerve blocks and fascial plane blocks in perioperative pain management.

The prevalence of keywords related to perioperative pain management (postoperative pain, postoperative analgesia, regional anesthesia) suggests that contemporary research in anesthesiology is heavily centered on enhancing patient safety, optimizing anesthesia techniques, and improving postoperative recovery (17-19). These findings align with global trends in anesthesiology research, where there is a growing emphasis on opioid-sparing anesthesia techniques, enhanced recovery protocols, and multimodal analgesia approaches (20,21). The dominance of regional anesthesia keyword further suggests an increasing interest in alternatives to general anesthesia, particularly for high-risk patient populations. This keyword analysis provides valuable insights for researchers, journal editors, and funding agencies in identifying emerging trends and research priorities in the field of anesthesiology. When examining the distribution of keywords over the years, it is evident that in the last five years, research topics have increasingly focused on postoperative pain, postoperative analgesia, and regional anesthesia. This trend aligns with the most frequently used keywords, further confirming the growing emphasis on these areas

in contemporary anesthesiology research. The findings suggest a shift towards opioid-sparing anesthesia strategies, regional anesthesia techniques, and multimodal pain management approaches. The increasing research focus on ultrasound-guided procedures and nerve blocks highlights the evolution of safer, more targeted anesthetic practices. These insights offer valuable guidance for future research priorities and funding strategies in anesthesiology.

Study Limitations

Despite these positive trends, certain limitations exist. The bibliometric analysis is inherently influenced by the scope of the WoS Core Collection, which may not capture regional journals and non-indexed publications. Furthermore, while citation analysis provides a measure of research impact, it does not necessarily reflect clinical adoption or translational value.

Another limitation concerns the scope of search terms used during data retrieval. The analysis was restricted to the keywords “anesthesia” and “anaesthesia” within the WoS Core Collection. As a result, related subfields such as “analgesia,” “sedation,” “pain management,” “critical care,” or “nerve block” might not have been comprehensively captured. Although this focused strategy ensured consistency and specificity, it may have excluded relevant publications indexed under broader or alternative terminologies. Future studies could adopt a more inclusive set of keywords to provide a more comprehensive overview of anesthesiology-related research.

Future studies should integrate qualitative assessments and clinical impact evaluations to complement bibliometric findings.

Despite these limitations, this study provides a robust bibliometric framework for understanding the evolution of anesthesia research in Türkiye. Addressing these limitations in future studies by incorporating multi-source data, qualitative assessments, and advanced analytical techniques would help further refine our understanding of research dynamics and scientific progress in the field of anesthesiology.

Conclusion

In conclusion, the findings of this study demonstrate an upward trend in Turkish anesthesia research, characterized by increasing publication output, robust institutional participation, and diversification of research topics. The observed trends suggest a continued emphasis on regional anesthesia, multimodal pain control, and patient safety, in alignment with international research directions. Although various scientific studies are conducted in the field of anesthesiology in Türkiye, it has been observed that, as in the rest of the world, regional anesthesia and postoperative pain have gained prominence in recent years. Ultimately, this bibliometric analysis serves as a strategic roadmap for shaping the future of anesthesia research in Türkiye, guiding efforts to enhance scientific output, academic collaborations, and global impact in the field.

Ethics

Ethics Committee Approval: As this study is a bibliometric analysis based on published literature, ethics committee approval was not required. Information has been provided to the ethics committee only through an official letter.

Informed Consent: This is a bibliometric study that systematically analyzes publications in the field of anesthesiology to identify research trends, active institutions and conceptual structures.

Footnotes

Authorship Contributions

Concept: G.A., B.S., Z.S., Design: G.A., K.E., Z.S., Data Collection or Processing: B.S., Analysis or Interpretation: G.A., B.S., Literature Search: G.A., A.E., Y.Ö., Writing: G.A., K.E., Z.S.

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

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

Data Availability Statement: The raw bibliometric data underlying this study, including the Web of Science (WoS) Core Collection query results, query date (December 6, 2024), and applied filters (Category: Anesthesiology; Countries/Regions: Türkiye or Turkey; Document Types: Article, Letter, Review Article, Editorial Material; Indexes: Science Citation Index Expanded (SCIE) or Emerging Sources Citation Index (ESCI), as well as the thesaurus file used for author/affiliation unification, are available from the corresponding author upon reasonable request.

References

1. Miller RD. The pursuit of excellence: the 47th annual Rovenstine Lecture. *Anesthesiology*. 2009;110:714-20.
2. Emala CW, Tawfik VL, Lane-Fall MB, Toledo P, Wong CA, Vavilala MS, et al. The anesthesiology physician-scientist pipeline: current status and recommendations for future growth—an initiative of the anesthesia research council. *Anesth Analg*. 2023;137:728-42.
3. Patel S. A bibliometric analysis of publications by anesthesia departments in the United Arab Emirates. *Cureus*. 2024;16:e65878.
4. Doğan G, Karaca O. Análise bibliométrica no campo da anestesiologia no período de 2009-2018 [A bibliometric analysis of the field of anesthesia during 2009-2018]. *Braz J Anesthesiol*. 2020;70:140-52.
5. Elango B, Rajendran P, Bornmann L. Global nanotribology research output (1996-2010): a scientometric analysis. *PLoS One*. 2013;8:e81094.
6. Chen H, Wan Y, Jiang S, Cheng Y. Alzheimer's disease research in the future: bibliometric analysis of cholinesterase inhibitors from 1993 to 2012. *Scientometrics*. 2014;98:1865-77.

-
7. Chen HM, Wu CH, Tsai SB, Yu J, Wang J, Zheng Y. Exploring key factors in online shopping with a hybrid model. *Springerplus*. 2016;5:2046.
 8. Archambault É, Campbell D, Gingras Y, Larivière V. Comparing bibliometric statistics obtained from the Web of Science and Scopus. *J Am Soc Inf Sci Technol*. 2009;60:1320-6.
 9. Tripathi RS, Blum JM, Papadimos TJ, Rosenberg AL. A bibliometric search of citation classics in anesthesiology. *BMC Anesthesiol*. 2011;11:24.
 10. Öner Ö, Hancı V, Büyükçoban S. A bibliometric analysis of the most cited articles in geriatric anesthesia. *Turkish J Geriatr*. 2020;23:410-8.
 11. Saltalı AO, Aslanlar E. Bibliometric analysis on pediatric caudal anesthesia. *Pediatr Pract Res*. 2023;11:7-12.
 12. Kayir S, Kisa A. The evolution of the regional anesthesia: a holistic investigation of global outputs with bibliometric analysis between 1980-2019. *Korean J Pain*. 2021;34:82-93.
 13. Çatalca S, Özmete Ö, Bozdoğan Özyılkan N. Scientific publication performance of the erector spinae plane block in Türkiye: a bibliometric analysis. *Turk J Anaesthesiol Reanim*. 2023;51:496-503.
 14. Yılmaz S, Bakış M. Anesteziyoloji alanında Türkiye ve dünyada yapılan bilimsel yayınların bibliyometrik analizi. *Türkiye Klin J Anesthesiol Reanim*. 2014;12:143-7.
 15. Bould MD, Boet S, Riem N, Kasanda C, Sossou A, Bruppacher HR. National representation in the anaesthesia literature: a bibliometric analysis of highly cited anaesthesia journals. *Anaesthesia*. 2010;65:799-804.
 16. Yılmaz HO, Babazade R, Turan OA, Babazade B, Koyuncu O, Turan A. Scientific publication performance of turkish anaesthesia clinics in high impact factor international journals between 2005 and 2014: a bibliometric analysis. *Turk J Anaesthesiol Reanim*. 2017;45:16-25.
 17. Pyati S, Gan TJ. Perioperative pain management. *CNS Drugs*. 2007;21:185-211.
 18. Jiang W, Qin Y, Chen L. Bibliometric analysis of multimodal analgesia research in the perioperative period: trends, contributions, and emerging areas (2013-2023). *Front Med (Lausanne)*. 2025;12:1573112.
 19. Robert C, Wilson CS. Thirty-year survey of bibliometrics used in the research literature of pain: analysis, evolution, and pitfalls. *Front Pain Res (Lausanne)*. 2023;4:1071453.
 20. Hyland SJ, Brockhaus KK, Vincent WR, Spence NZ, Lucki MM, Howkins MJ, et al. Perioperative pain management and opioid stewardship: a practical guide. *Healthcare (Basel)*. 2021;9:333.
 21. He J, Huang R, Liu Y, Chen Y, Zhong M. Global research frontiers and thematic trends in opioid-free anesthesia over the past 20 years: a bibliometric analysis. *Front Pharmacol*. 2025;16:1562765.