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Bibliometric Analysis of Articles on Pediatric Caudal Anesthesia

Pediatrik Kaudal Anestezi ile İlgili Makalelerin Bibliyometrik Analizi

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Abstract

Aim: Bibliometric analysis studies are studies that examine the literature on a subject numerically and holistically, and have recently attracted a lot of attention in the field of medicine. The number of articles about pediatric caudal anesthesia has increased gradually over the past few decades. However, there is no bibliometric analysis study on pediatric caudal anesthesia in the literature. This study aimed to present a bibliometric analysis of articles published in the Web of Science (WoS) Core database related to pediatric caudal anesthesia.

Material and Method: We used the search engine of WoS and included all types of contributions (original articles, reviews, letters, etc.) in the bibliometric analysis. The keywords used to access articles are "pediatric, caudal, anesthesia, analgesia, and block" words. For the analyses, VOSViewer 1.6.13. version was used.

Results: The most cited publications on pediatric caudal anesthesia were in the following journals: Pediatric Anesthesia (84 articles, 1892 citations), Anesthesia and Analgesia (26 articles, 884 citations) and Anesthesiology (7 articles, 537 citations). The countries that publish and receive the most citations about pediatric caudal anesthesia starting from the highest are the USA, France, Sweden, Turkey, Canada.

Conclusion: The following parameters were the foci of a thorough analysis of articles on pediatric caudal anesthesia: publication date, number of citations, journal name, theme, and country. It is noteworthy that pediatric caudal anesthesia currently plays a crucial role in pediatric anesthesia research. However, there is still a need for new studies from different countries on different cases in the literature on pediatric caudal anesthesia.

Keywords: Analgesia, Anesthesia Caudal, Bibliometrics, Pediatrics

Öz

Amaç: Bibliyometrik analiz çalışmaları, bir konu hakkındaki literatürü sayısal ve bütünsel olarak inceleyen ve son zamanlarda tıp alanında oldukça ilgi gören çalışmalardır. Pediatrik kaudal anestezi ile ilgili makalelerin sayısı son birkaç dekatta kademeli olarak artmıştır. Ancak literatürde pediatrik kaudal anestezi ile ilgili bibliyometrik analiz çalışması bulunmamaktadır. Bu çalışmada pediatrik kaudal anestezi ile ilgili olarak Web of Science (WoS) Core veritabanında yayınlanan makalelerin bibliyometrik analizinin sunulması amaçlanmıştır.

Gereç ve Yöntem: WoS arama motorunu kullandık ve her türlü katkıyı (orijinal makaleler, incelemeler, mektuplar vb.) bibliyometrik analize dahil ettik. Makalelere ulaşmak için kullanılan anahtar kelimeler "pediatrik, kaudal, anestezi, analjezi ve blok" kelimeleridir. Analizler için VOSViewer 1.6.13. versiyonu kullanıldı.

Bulgular: Pediatrik kaudal anestezi ile ilgili en çok atıf yapılan yayınlar Pediatric Anesthesia (84 makale, 1892 atıf), Anesthesia and Analgesia (26 makale, 884 atıf) ve Anesthesiology (7 makale, 537 atıf) dergilerinde yer aldı. Pediatrik kaudal anestezi ile ilgili yayın yapan ve sırasıyla en çok atıf alan ülkeler ABD, Fransa, İsveç, Türkiye, Kanada'dır.

Sonuç: Pediatrik kaudal anestezi hakkındaki makalelerin kapsamlı analizinde "yayın tarihi, alıntı sayısı, dergi adı, konu ve ülke" gibi parametrelere odaklanılmıştır. Pediatrik kaudal anestezinin şu anda pediatrik anestezi araştırmalarında çok önemli bir rol oynaması dikkat çekicidir. Bununla birlikte, literatürde pediatrik kaudal anestezi konusunda farklı ülkelerden farklı vakalar üzerinde yeni çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Analjezi, Anestezi Kaudal, Bibliyometrik, Pediatri

INTRODUCTION

Caudal anesthesia is one of the most used regional blocks, especially in pediatric anesthesia. In most surgical procedures of the lower abdomen and lower extremities, caudal anesthesia is widespread in intraoperative and postoperative analgesia (1). The following reasons highlight caudal anesthesia as a preferable method: it is safe to use, easy to apply and can be used for many surgical procedures (2). The frequency of use of caudal block by pediatric anesthesiologists is very high in the United States, with 61% of the central blocks applied in pediatric patients in France and 49.5% of the central blocks applied in Italy (3). In addition to surgical anesthesia, pediatric caudal anesthesia can treat acute and chronic pain (caudal analgesia) (4). Pediatric caudal analgesia is effective in postoperative analgesia after intraumbilical, lower abdominal, and lower extremity operations under general anesthesia (5). At the same time, there are a very high number of publications on caudal anesthesia in many different journals in the literature. One of the most critical indicators showing the contribution of these publications in the field is the number of citations of the publication. The number of citations is beneficial to make inferences about the impact of the research on a subject, i.e., its contribution to the literature (6). Moreover, the number of citations is critical for many institutions and organizations (for example, the Council of Higher Education, and universities). They use it in determining the metrics of the journals in the literature and evaluating the individual performance of the authors of the articles and in procedures such as recruitment, rewarding, and extending the term of office (7). The number of citations of publications is necessary to calculate the H index, the journal impact factor (IF), the eigenfactor score, and the SCImago journal rank, which are among the crucial indicators related to the journals in the literature (8). At the same time, knowing the most cited articles in a particular research field is necessary to determine the most active journals, authors, countries, institutions, and expertise; the scope of the research field in question (9). Therefore, bibliometric research has been carried out intensively by researchers in recent years. There are bibliometric analysis studies on some methods, some types of diseases, and medical education in medicine (10-17). In the field of anesthesia, in bibliometric analysis studies, it was observed that subjects such as studies in the field of anesthesia, anesthesia applications in different age groups, and regional anesthesia were discussed in bibliometric analysis studies (18-21). There was no study involving bibliometric analysis of studies on pediatric caudal anesthesia. Therefore, this study aimed to conduct a bibliometric analysis in this field.

MATERIAL AND METHOD

Study Design

In this study, the document analysis method, one of the qualitative research methods, was used. This study had a bibliometric analysis approach to determine the trends in pediatric caudal anesthesia and analgesia in the field of anesthesia in medical science worldwide. Bibliometric analysis studies are crucial in reviewing the research and findings on a specific subject by combining them (22). Bibliometric analyses provide an opportunity to analyze the trends of the studies in the literature related to the determined subject, the scientific dimension, impact, growth rate, etc., of researchers, publications, and journals and to consider their intellectual status in the research field (23). With bibliometric analysis studies, it is possible to examine the literature numerically and holistically (24, 25). According to Hosseini et al., bibliometric analysis has the following steps: data collection, bibliometric data processing, analysis-visualization, and transfer of findings (26). This bibliometric analysis had the same steps.

Data collection

The bibliometric analysis scanned the WoS database (Web of Science Core Collection database maintained by Clarivate Analytics. Access date: 18.9.2022). WoS (the standard and most used tool for generating citation data) was used for research assessment purposes. Various terms related to pediatric caudal anesthesia were entered into the search box. Then, the root of each keyword was entered one by one in the "Title" field. Specifically, "pediatric" and "caudal" words were written in the search box with an "AND" between them, indicating the presence of both words together. Furthermore, anesthesia, analgesia, and block words were added with "or" next to these two words. The wildcard "*" was used to obtain more comprehensive results in each search and to obtain plural or different word attractions of the root keyword. Additionally, different words expressing the same concepts were used when necessary to make a more comprehensive search. Different spellings of words (pediatric-paediatric, anesthesia-anaesthesia, etc.) were also used in searches. To reach articles containing pediatric caudal anesthesia, pediatric caudal block, and pediatric caudal analgesia simultaneously, "or " linker was used between anesthesia, analgesia, and block words. As a result of this search, 346 articles were reached. A filter for languages (English) was used, all types of articles were considered, and the topics were selected from various sources.

Data analysis

As a result of the keyword searches made in the WoS system, the steps described in **Figure 1** were applied to access the bibliometric data as a text document. Each of the obtained text documents contains the author,

title, source, summary, citation information, and all other information (journal publication information) related to the article (Web of Science Core Collection Help, 2019).
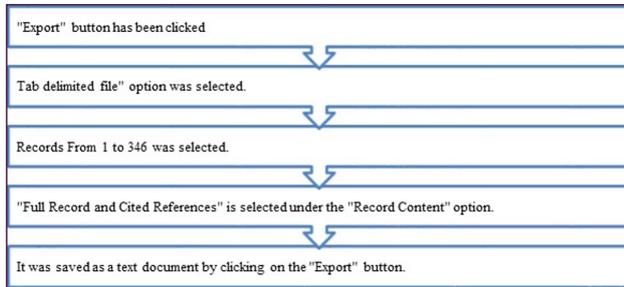

"Export" button has been clicked

Tab delimited file" option was selected.

Records From 1 to 346 was selected.

"Full Record and Cited References" is selected under the "Record Content" option.

It was saved as a text document by clicking on the "Export" button.

Figure 1. The process to retrieve WoS bibliometric data

The number of articles and the total number of citations according to the years obtained from the WoS core database. Then, they were fed into the Excel program. The graphics were created with Excel. The "Citeration Report" link on the "Results" page was clicked to get the number of articles and citations by year, and the screenshot of the "Times Cited and Publications Over Time" chart on the "Citation Report" page was taken separately as Publication and Citation. Then, text documents containing keywords were visualized by VOS viewer 1.6.13. During this visualization;

- Distribution of articles published in terms of keywords by year
- Number of citations of articles published in terms of keywords by year
- Most used concepts in terms of keyword
- Citation analysis in the context of the journal through the keyword
- Citation analysis in the context of the country through the keyword.

In addition, the citation per publications (CPP) score of the countries with the highest number of publications and citations was calculated as follows:

CPP=Total citations from WoS (TC)/Number of Articles (27).

RESULTS

In the findings section, the results of the analysis of the keywords "pediatric" and "caudal" and "analgesia" or "anesthesia" or "block" and 346 articles in the WoS database by year, the number of citations, the most used concepts in these publications, the citation analysis of key concepts in the context of the journal and the citation analysis in the context of the country are presented as graphs and concept maps.

Findings related to the number of publications

The numerical distribution of the publications on pediatric caudal anesthesia in WoS from 1991 to the present day is seen (**Figure 2**). According to the graph, while the number of publications scanned in WoS related to Pediatric Caudal was 3 in 1991, this number increased 6.66 times in 2021 and reached 20 publications per year. Still more, the least published years related to pediatric caudal anesthesia were 1992 and 1994 (two publications), while the most published year was 2020 (25 publications).
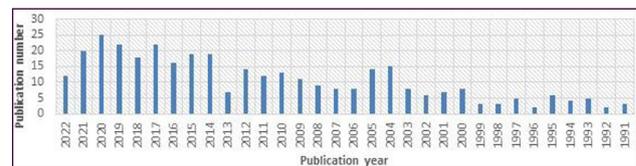

Figure 2. Article distribution graph by year

Findings related to the number of citations

Figure 3 shows a graph of the number of citations received by the publications published on pediatric caudal anesthesia in WoS.

Publications on pediatric caudal anesthesia started to be cited in WoS in 1992. In the last decade, the annual citation average on the subject has been above 200 and reached 400 figures since 2020 (**Figure 3**).

Figure 3. Graph of the citation distribution of publications by year

Most Used Concepts

With the help of text-based data obtained from the WoS system, VOSviewer's co-occurrence analysis generated a map of the most used concepts together with keywords. During this analysis, "Author Keywords" was selected. The minimum number of occurrences of a keyword was set to 10. The number of keywords to be selected is given as 24 by the program. The concept number value included in the articles published with keywords was 24 (**Figure 4**). These concepts formed three separate clusters, and each cluster is in different colors. The 1st cluster consists of 11 concepts, the 2nd cluster 8 concepts, and the last cluster 5 concepts. Considering the leading concepts of each cluster, the most mentioned concept of the first cluster was "caudal" (f=49), the most common concept in the second cluster was "caudal block" (f=52), and in the last cluster was "analgesia" (f=32). Interestingly, the emerging concepts were also among the keywords of the research. The drugs in the concept map are as follows: tramadol, dexmedetomidine, bupivacaine, levobupivacaine, clonidine, ketamine, fentanyl, and ropivacaine.
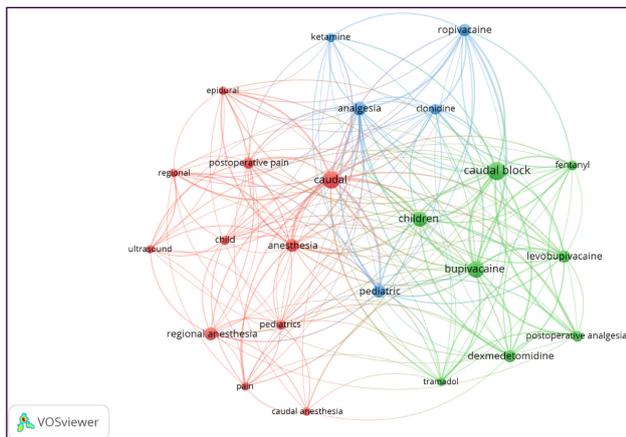
Figure 4. Map of the most used concepts

Citation Map in the Context of the Journal

VOSviewer Citation analysis produced the citation map in the context of the journal with the help of text-based data obtained from the WoS system. "Sources" was selected during this analysis. The minimum number of documents of a source was set to 5. The minimum number of citations of a source was set to 0. Set values filtered a total of 16 journals. The journal-citation map created by the VOSviewer program is in **Figure 5**. There is an intense connection between the published journals (**Figure 5**). The ranking of the top 5 journals according to the number of citations among 16 journals is as follows: Pediatric Anesthesia (76 articles, 1575 citations), Anesthesia and Analgesia (26 articles, 884 citations), Anesthesiology (7 articles, 537 citations), British Journal of Anesthesia (7 articles, 366 citations), and Paediatric Anesthesia (8 articles, 317 citations). According to our web browsing results, Pediatric Anesthesia, which ranks first on the list, and Paediatric Anesthesia, which ranks fifth, are actually the same journals. The journal was under the name Paediatric Anesthesia until March 2004, after which it continued under the name Pediatric Anesthesia. The actual single journal had 84 articles on pediatric caudal anesthesia with 1892 citations. In other words, approximately a quarter (24.3%) of the 346 articles reviewed in WoS on pediatric caudal anesthesia were published in this journal.

Citation Map in the Country Context

VOSviewer Citation analysis generated the citation map in the context of the country with the help of text-based data obtained from the WoS system. "Countries" was selected during this analysis. The minimum number of documents in a country is was 5, while the minimum number of citations in a country was 0. As a result of the set values, a total of 19 citing countries were reached. The country-citation map created by the VOSviewer program is given in **Figure 6**. A citation network was formed between 19 countries, as seen in **Figure 6**, in publications on pediatric caudal anesthesia. The ranking of the top 5 countries according to the number of citations

is as follows: USA (71 articles, 1395 citations), France (16 articles, 698 citations), Sweden (20 articles, 684 citations), Turkey (38 articles, 468 citations), and Canada (21 articles, 432 citations). According to the CPP score calculated to reveal the publication productivity of the countries in the top five on pediatric caudal anesthesia according to the number of citations, the previous ranking was reordered with France (43.62) as the first, followed by Sweden (34.2), Canada (20.57), the USA (19.64), and Turkey (12.31).
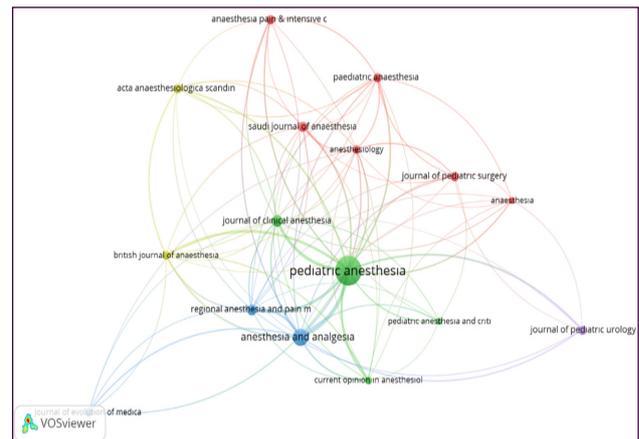

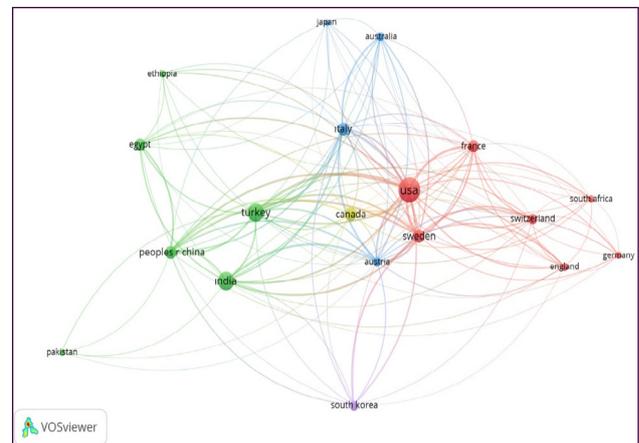**Figure 5.** Citation map according to the journal where the publication is made

Figure 6. Map of citations in the context of the country

DISCUSSION

In recent years, anesthesiologists have frequently preferred pediatric caudal anesthesia in pediatric surgeries and pediatric caudal analgesia in postoperative analgesia (28). Therefore, it is one of the hot topics that attract attention. Within the scope of this research, the bibliometric examination of the publications scanned in WoS related to pediatric caudal anesthesia was made, and the number of publications by year, the number of citations by year, the countries with the highest number of publications, the countries received the highest citations, the journals that published the most and received the most citations, and the concepts in the publications related to the subject were determined.

This bibliometric analysis reached 346 publications in the WoS database between 1991 and 2022 were reached. These publications were in 16 different journals from 19 countries. According to the results, research on pediatric caudal anesthesia started to attract attention in the 1990s, and interest in the subject increased gradually. While the number of publications scanned in WoS related to pediatric caudal anesthesia was 3 in 1991, this number increased 6.66 times in 2021 and reached 20 publications annually. However, as we mentioned in the introduction section, caudal anesthesia has a significant percentage (50-60% ratio) among the anesthesia applications used in pediatric patients (3), so more publications are necessary on the subject. The first citation on the subject in the WoS is in 1992, and these citations increased considerably in the last decade (annual number of citations between 200-400). This increase indicates an increasing interest in the subject.

The most published and cited journals on pediatric caudal anesthesia were Pediatric Anesthesia, Anesthesia and Analgesia, Anesthesiology, and the British Journal of Anesthesia. Pediatric Anesthesia magazine published 12 issues a year in England. The journal has been publishing since 1991, and the impact factor (IF) is 2.129 for 2021 (IF2021). Anesthesia and Analgesia is a journal that publishes 12 issues a year in the USA. The journal is the publishing body of the International Society for Anesthesia Research. The IF2021 of the journal is 6.627. Anesthesiology magazine, which ranks third on the list, is a magazine that publishes four issues a year. The journal is being prepared for publication by the American Society of Anesthesiologists (ASA). The IF2021 value of the journal is 8.139. British Journal of Education is a journal with a very high impact factor (11.719 for 2021), which publishes four issues a year from the UK. In our study, the journals that we have determined to have the most cited publications on pediatric caudal anesthesia are the journals that have been included in the list of the most cited journals in similar bibliometric analysis studies conducted on different subjects in the field of anesthesia (18, 20, 29, 30). They are among the most productive journals in this research field for the following reasons: their impact factors, their publication history spanning many years, and their inclusion in this and similar bibliometric analysis studies. Moreover, the journals included in the list can be suggested as a source by scientists who review or want to publish the results of research on pediatric caudal anesthesia.

The ranking of the top 5 countries according to the number of citations received by the publications on pediatric caudal anesthesia is as follows: USA, France, Sweden, Turkey, and Canada. According to the CPP score, the countries with the most citations are France, Sweden, Canada, the USA, and Turkey. Four of the countries included in the list are countries with high-income levels according to World Bank data, while only Turkey is in the category of developing countries. In previous studies, countries with high-income levels publish more scientific studies on anesthesiology (18). In our study, the fact that the four countries included in the list (USA, France, Sweden, and Canada) are among the countries with high-income levels coincides with this finding. According to the data of the World Bank, Turkey (https://data.worldbank.org/country) is a developing country and a country in the upper-middle income category. The fact that it is among the five most cited countries in this field is a good sign of improvement, and other developing countries also need publications on the subject.

Study Limitations

This study, which presents the bibliometric results of studies screened in WoS on pediatric caudal anesthesia, also has some limitations. First, the results of this study are limited to the studies conducted in the field of pediatric caudal anesthesia in the WoS core database, whose article publication language is English and which were reached in the analyses conducted by the VOSwiever program. Researchers who will conduct similar research in this study can also review other databases, such as PubMed, Scopus, and Google Scholar, and make international comparisons. The scope of the studies can be expanded by including the studies conducted in different languages. Additionally, the authors recommend that researchers who will study the field of anesthesia conduct bibliometric analysis studies on different keywords.

CONCLUSION

It is noteworthy that pediatric caudal anesthesia currently plays a crucial role in pediatric anesthesia research. However, there is still a need for new studies from different countries on different cases in the literature on pediatric caudal anesthesia. Undeveloped and developing countries should be encouraged to conduct research in the field of pediatric caudal anesthesia.

ETHICAL DECLARATIONS

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