



Pediatric nephrotic syndrome with science mapping method

Bilim haritalama yöntemi ile pediatrik nefrotik sendrom

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ABSTRACT

Aim: Pediatric nephrotic syndrome (PNS) can be seen in children of all ages. Bibliometrics is the mathematical and statistical quantitative analysis. It is essential to determine the studies carried out in any field, their development and changes in the process, and possible trends. We aim to examine the articles on Pediatric nephrotic syndrome using the science mapping technique. **Materials-Methods:** The Web of Science Core Collection database was preferred in our study. The obtained data was organized and filtered. Finally, the analysis continued with 3423 articles. The reviewed 3423 articles were analyzed in two parts. First, articles, journals, researchers, institutions, and the countries were examined. Second, the intellectual structure of the subject was examined. **Results:** It is seen that the first study on the subject of PNS was made in 1980. The number of scientists who published articles in the examined area is 12018. The number of studies per author is 0.285, the number of authors per study is 3.51, and the cooperation index is 3.66. USA, China, Japan, India, France, and Turkey have dominant positions and are among the leading countries. According to the analysis, Bagga A and Ghiggeri GM had the highest h-index and g-index values scores. Pediatric Nephrology and Kidney International are the most cited journals. **Conclusions:** A panoramic view of a subject or discipline can be obtained with bibliometrics. Scientific mapping is one of the main areas of bibliometric analysis. With scientific mapping the relationships between universities, scientists, and scientific works at the base of scientific disciplines can be visualized..

ÖZ

Amaç: Pediatrik nefrotik sendrom her yaşta çocuklarda görülebilmektedir. Bibliyometri, matematiksel ve istatistiksel nicel analizdir. Herhangi bir alanda yapılan çalışmaların, gelişimlerinin ve süreçteki değişimlerin ve olası eğilimlerin belirlenmesi esasına dayanmaktadır. Pediatrik nefrotik sendrom ile ilgili makaleleri bilimsel haritalama tekniğini kullanarak incelemeyi amaçlıyoruz. **Gereç ve Yöntem:** Çalışmamızda Web of Science Core Collection veritabanı tercih edilmiştir. Elde edilen veriler düzenlenmiş ve tasnif edilmiştir. Son olarak 3423 makale ile analize devam edilmiştir. İncelenen 3423 makale iki bölümde incelenmiştir. Öncelikle makaleler, dergiler, araştırmacılar, kurumlar ve ülkeler incelenmiştir. İkinci olarak konunun düşünsel yapısı incelenmiştir. **Bulgular:** Pediatrik nefrotik sendrom konusunda ilk çalışmanın 1980 yılında yapıldığı görülmektedir. İncelenen alanda makale yayımlayan bilim insanı sayısı 12018'dir. Yazar başına çalışma sayısı 0.285, çalışma başına yazar sayısı 3.51'dir, işbirliği endeksi 3.66'dır. ABD, Çin, Japonya, Hindistan, Fransa ve Türkiye hakim durumda ve önde gelen ülkeler arasında yer almaktadır. Analize göre Bagga A ve Ghiggeri GM en yüksek h-index ve g-index değerlerine sahiptir. Pediatrik Nefroloji ve Böbrek Uluslararası en çok atıf alan dergilerdir. **Sonuç:** Bibliyometri ile bir konunun veya disiplinin panoramik görüntüsü elde edilebilir. Bilimsel haritalama, bibliyometrik analizin ana alanlarından biridir. Bilimsel haritalama ile bilimsel disiplinler temelinde üniversiteler, bilim adamları ve bilimsel eserler arasındaki ilişkiler görselleştirilebilir.

ARTICLE INFO/MAKALE BİLGİSİ

Key Words: Pediatric Nephrotic Syndrome, Bibliometrics, Scientific Mapping, Web of Science Core Collection.

Anahtar Kelimeler: Pediatrik Nefrotik Sendrom, Bibliyometriks, Bilimsel Haritalama, Web of Science Core Collection.

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INTRODUCTION

A nephrotic syndrome is a group of symptoms that indicate that the kidneys are not working correctly. Proteinuria and edema are the most common symptoms. The nephrotic syndrome usually occurs when the glomerular is damaged and results in leakage of protein from the blood into the urine. Pediatric nephrotic syndrome (PNS) can be seen in children of all ages. However, it most commonly affects children between two and seven, especially boys. The most common cause of PNS is diseases that affect the filtering system

of the kidney. Other causes are certain infections and medications. PNS occurs in approximately five out of every 100,000 children worldwide (1–3)

Bibliometrics is the mathematical and statistical quantitative analysis of the relationships among works produced by individuals or institutions in a particular field, period, and region. It is essential to determine the studies carried out in any field, their development and changes in the process, and possible trends. Especially today, when the literature has become highly comprehensive, the importance of correct analysis



of data has increased. This is where bibliometric methods come into play. Bibliometric methods are used to analyze large volumes of data in the literature. The analyzes contain information about a scientific discipline, the subject studied, academic institutions, countries, authors, cooperation between authors (4–6).

A panoramic view of a subject or discipline can be obtained with bibliometrics. Information about scientists and works related to the subject and discipline can be obtained. Citation performances of scientists and scientific quality of works can be examined. The aging rate of the literature can be calculated by analyzing the citations (7).

One of the main areas of utilization of bibliometric analysis is scientific mapping. This concept aims to examine and visualize the relationships between universities, scientists, and scientific works at the base of scientific disciplines (8).

There is a great deal of software available in science mapping; some are Gephi, UCINET, Pajek, CoPalRed, Cytoscape, CiteSpace II, and VOSviewer (6,8).

Our study aims to examine the articles on PNS using the science mapping technique.

MATERIALS AND METHODS

The research framework of the subject of PNS is presented in Figure 1. First, a database containing high-quality data was selected to perform a bibliometric analysis of the P NS subject. The Web of Science Core Collection (WoS) database was preferred in our study since it contains high-quality and effective scientific articles accepted worldwide. WoS, one of the most influential bibliographic databases in the academic world, is widely used to follow up high-quality studies (9).

Secondly, the obtained data needs to be organized and filtered. As a result of the search in the WoS database, 5225 articles were found. In order to avoid unrelated literature information, only “Articles and Review Articles” were selected, and 4126 articles were obtained. Only “English” was chosen as the publication language, and the number of articles was found to be 3934. When the Web of Science index was selected as “SCI_EXPANDED” and “SSCI,” the number decreased to 3661. Finally, since the processing of the articles dated 2022 continue in the current situation, they were excluded from the review, and the analysis continued with 3423 articles.

The bibliometric analysis of WoS data was performed with the Bibliometrix program. Bibliometrix is one of the newest open-source software written in R base for scientific literature mapping (5)

The reviewed 3423 articles were analyzed in two parts. In the first part, articles, journals, researchers, institutions, and the countries where the studies were conducted were examined with a holistic approach. Comparisons were made by calculating the h, g, and m indexes in the examinations. In the second part, the intellectual structure of the PNS subject was examined through content analysis using word and citation analysis. In this way, the research’s main topics, thematic development, and focuses were determined.

The Hirsch index, known as the H-index, was created by Jorge Hirsch in 2005. If any author has X articles cited at least X times by other authors, the author’s h-index is equal to X(10).

The G-index was designed by Leo Egghe in 2006. It is an alternative to the h-index, which does not average the number of citations, to measure the global citation performance of a series of articles. The index

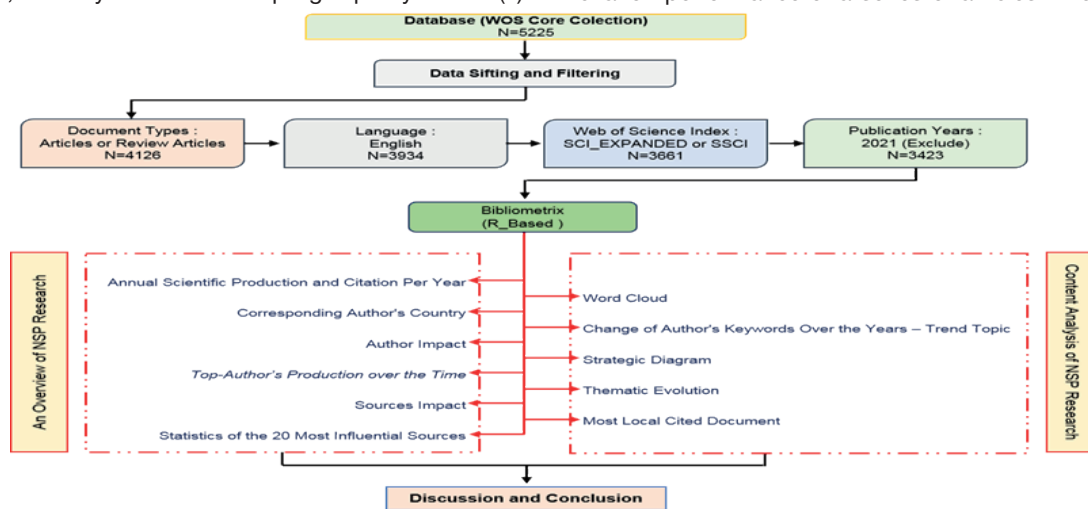


Figure 1. Workflow Of Science Mapping

is calculated based on the distribution of citations received by a particular researcher's articles. Contrary to the h-index, the G-index gives more weight to highly cited articles (11).

The H-index is not considered sufficient to evaluate academic achievement for young scientists since young scientists do not have enough time to get the citation. For young scientists, the impact factor of the journal in which they published their articles is a more realistic measure. Comparing the performance of scientists with different lengths of academic backgrounds is to compare the h-index to the number of years of active scientific study. This index created by Hirsch was defined as the m-index (12).

Within the scope of content analysis, a word cloud of the keywords of the articles on PNS was created with the Bibliometrix method. The word cloud is a graphical display of current headlines on the PNS topic. With the help of the word cloud, different relationship areas and the most dominant terms can be determined (13).

Thematic mapping reveals the temporal dynamics of research areas in contrast to static approaches that neglect these dynamics. Our research examined the thematic development of articles on PNS between 1980 and 2020. The research period (1980-2020) was divided into four consecutive sub-periods, considering the number of documents and a fixed time interval. The time segmentation is uneven because the number of articles published in the early years is limited. The first sub-period was determined as 23 years (1980-2002). The second sub-period is eight years (2003-2010), the third sub-period is six years (2011-2016), and the fourth sub-period is four years (2017-2020).

Thematic mapping was created using word analysis by the Bibliometrix program. The word analysis is based on the keywords in the articles. Bibliometrix has grouped the most frequent keywords into theme clusters. During the analysis, the first 250 keywords were used. The words in the clusters are the keywords with the highest frequency in that cluster. The size of the clusters is proportional to how often keywords are used. Each of the subperiods is divided into four quarters. Each quartile represents different themes, and two measures were used to scale the quartiles or sets of themes. These measures are centrality and density. Density and centrality represent the thematic map as the y-axis and the x-axis, respectively. Centrality grades the importance of the chosen theme and intensity rates the development (14-16).

- "Motor Themes" is the first quarter theme, located at the top right. These themes express high density

and high centrality. Keywords in this theme have solid internal ties. They are essential for shaping the subject of study (16)

- "Highly Developed and Isolated Themes" is the second quarter theme located at the top left of the thematic map. This theme expresses higher density and lower centrality. They are essential for the development of the study subject (16).

- "Emerging or Declining Themes" is the third quarter theme, and it is these themes appear in the lower-left part of the thematic map. They are newly emerging or diminishing themes. Centrality and density values are low (16).

- "Basic and Transversal Themes" is the fourth quarter theme located at the bottom right of the Thematic map. They are low density, high centrality themes. Much research has been done about them, and they have solid internal ties. It is of vital importance to the subject of study. Words with frequent repetitions and close relationships are included in this theme (16).

The Sankey Diagram was used to create a thematic evolution map. In the Sankey diagram, each port represents a set of themes. The size of the nodes is proportional to the number of keywords. Flow lines between nodes show the direction of the evolution of theme clusters over time. The edge width of the node is the sum of the connected elements (17).

Citation analyzes are used to examine the development dynamics against the background of a research topic. In our research, citation analysis was conducted to analyze the articles on the subject of PNS and their relationships. Local Citations in citation analysis refer to the number of citations made by the articles in the collected data set of work. Global Citation refers to the number of times an article has been cited in the WoS core database. Typically, more citations are made to articles published in previous years. New publications do not have enough time for citation. Annual Local Citations (LC/YYP) and Annual Global Citations (GC/YYP) parameters were used to eliminate this inequality (18).

RESULTS

Is seen that the first study on the subject of PNS was made in 1980. The number of scientists who published articles in the examined area is 12018. While the number of studies with a single author is 145, the number of studies with multiple authors is 11873. The number of studies per author is 0.285, the number of authors per study is 3.51, and the cooperation index is 3.66.

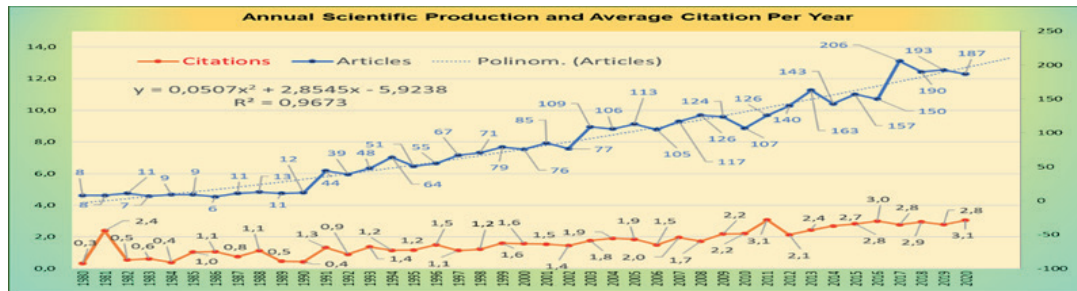


Figure 2. Annual Scientific Production and Citation Per Year

Annual Scientific Production and Citation Per Year

The annual scientific production and citation per year on PNS between 1980 and 2020 are shown in Figure 2.

It is seen that the annual number of articles in the field of PNS did not change significantly from 1980 to 1990, increased since 1991, and reached the highest number with 206 articles in 2017. In our study, Trendline, Trendline Equation, and R²-Confidence coefficient have been added to the annual scientific production graph. The closer the reliability coefficient value is to integer 1, the stronger the Trendline data values added to the graph represents. The reliability coefficient value we obtained is very close to 1 with 0.967. The Trendline represents the data very well. The equation representing the trend line is presented on the graph.

Table 1. Top 20 Countries in PNS Studies

Country	TPC	SCP	MCP	MCP_Ratio
USA	619	513	106	0.1712
CHINA	357	339	18	0.0504
JAPAN	339	334	5	0.0147
INDIA	171	157	14	0.0819
FRANCE	165	139	26	0.1576
TURKEY	160	151	9	0.0563
ITALY	143	122	21	0.1469
GERMANY	141	112	29	0.2057
U. KINGDOM	119	94	25	0.2101
POLAND	108	96	12	0.1111
CANADA	100	66	34	0.34
EGYPT	62	58	4	0.0645
KOREA	58	50	8	0.1379
IRAN	53	49	4	0.0755
NETHERLANDS	51	35	16	0.3137
BRAZIL	49	47	2	0.0408
AUSTRALIA	42	37	5	0.119
SOUTH AFRICA	42	38	4	0.0952
SAUDI ARABIA	41	36	5	0.122
FINLAND	40	34	6	0.15

TPC = Total number of publications by the corresponding author's country,
 SCP = Single country publications,
 MCP = Multiple country publications,
 MCP_Ratio=MCP/TPC

When the annual citation per year data is analyzed, it is seen that the highest average number of citations per year was reached 3.0 in 2016. This number was 2.8 in 2017 and 2020. Since it takes time for current articles to be cited, it can be said that the number of citations of articles has increased in recent years.

Country Statistics

The top 20 most productive countries in research on PNS are in Table 1. It is seen that the USA, China, Japan, India, France, and Turkey have dominant positions and are among the leading countries in terms of related authors.

The USA ranks first with 513 and 106 articles, respectively, in single-country and multi-country articles.

The USA is followed by China, Japan, and Canada. The country with the highest MCP rate in Canada, with 0.34.

Author Statistics

Statistics of the top 20 authors who made the most compelling studies on PNS between 1980 and 2020 are presented in Table 2. In Table 2, respectively; The h-index, g-index, m-index, total citations (TC), the total number of publications (NP), and first year of publication in the PNS field (PY-start) were analyzed. According to the analysis, Bagga A (24) and Ghiggeri GM (24) had the highest h-index and g-index values scores. The authors with the highest M-index are Emma F (1.158) and Hildebrandt F (1.095). The author with the highest number of citations is Hildebrandt F (2157), and the author with the highest number of publications is Iijima K (53). It is noteworthy that Gipson DS, which started its publication life in 2006, has an h index (17), g index (36), m index (1.063), the total number of citations (1298), and the total number of publications (37).

Figure 3 shows the authors' article production over time. Considering the length of the line, the authors who published the article for the longest time are Yoshikawa N, Ghiggeri GM, and Holmberg C, respectively. Yoshikawa N, who first published an article in 1986, continues studying the subject. The size of the circles in the figure indicates that many articles have been published. Bagga A and Gipson DS had the highest number of articles, with eight articles in 2018 and

Table 2. The 20 Most Influential Authors

Author	h_index	g_index	m_index	TC	NP	PY_start
BAGGA A	24	43	0.8	1896	46	1992
GHIGGERI GM	24	42	0.727	1828	49	1989
HILDEBRANDT F	23	32	1.095	2157	32	2001
EMMA F	22	32	1.158	1534	32	2003
HARI P	22	30	0.957	1172	30	1999
IIJIMA K	22	41	0.786	1759	53	1994
NIAUDET P	22	32	0.629	1701	32	1987
YOSHIKAWA N	21	34	0.583	1181	40	1986
HOLMBERG C	20	31	0.556	1060	31	1986
KEMPER MJ	19	29	0.826	1007	29	1999
TRACHTMAN H	19	37	0.543	1812	37	1987
CARIDI G	18	24	0.857	1101	24	2001
ISHIKURA K	18	26	1	703	33	2004
JALANKO H	18	25	0.563	935	25	1990
TEJANI A	18	20	0.462	1377	20	1983
GIPSON DS	17	36	1.063	1298	37	2006
GULATI S	17	26	0.607	697	26	1994
HODSON EM	17	20	0.773	809	20	2000
HONDA M	17	27	0.81	749	29	2001
ITO S	17	29	0.607	892	30	1994

Note: NP = Number of publications, TC = Total citations, PY_start = Publication year starting.

2019. The darkness of the circles indicates the number of citations the author has taken per year. Emma F. reached the highest number of citations in 2017 with 58.4 citations. Gipson DS. is in second place with 49 citations in 2013. Of the twenty authors in the PNS field, 11 were included in this field of study in 1999 and later.

Journal Statistics

Articles on PNS have been published in a wide variety of journals. The 3423 articles that we obtained were published in 592 different journals. The articles' and the journal's h-indexes were analyzed to investigate the most influential journals. Figure 4 shows the top 20 journals that have published the most articles on the subject of PNS. These can be considered the most impactful journals in the PNS field. Pediatric Nephrology and Kidney International, the journals with the highest h-index values (H-index 56 and 48, respectively), have published 762 and 113 articles.

Table 3 shows the top 20 journals by the total number of articles. 51.7% of the total articles (1771/3423) were published in these first 20 journals. Pediatric Nephrology is the journal that publishes the most articles (22.2% of total articles). Pediatric Nephrology (17608) and Kidney International (6100) are the most cited journals.

Moreover, Citations Per Paper were analyzed for each journal. The Journal of the American Society of Nephrology has the highest value, with an average of

Table 3. Statistics of 20 Most Impactful Journals in PNS Research

Source	NP	TC	TC/NP	h_index	PY_start
PEDIATRIC NEPHROLOGY	762	17608	23.11	56	1987
KIDNEY INTERNATIONAL	113	6100	53.98	48	1981
NEPH. DIALYSIS TRANSPLANTATION	111	3961	35.68	37	1991
CLINICAL NEPHROLOGY	109	2063	18.93	25	1980
AM J OF KIDNEY DISEASES	72	3438	47.75	31	1982
J OF THE AM. SOCIETY OF NEPHROLOGY	62	4367	70.44	41	1992
CLIN. J OF THE AM. SOCIETY OF NEPHR.	55	3128	56.87	33	2006
CLIN.AND EXPERIMENTAL NEPHROLOGY	44	463	10.52	12	2008
JOURNAL OF NEPHROLOGY	43	462	10.74	13	1995
NEPHRON	43	910	21.16	18	1983
AMERICAN JOURNAL OF NEPHROLOGY	41	1049	25.59	20	1987
PEDIATRICS INTERNATIONAL	41	420	10.24	12	2001
EUROPEAN JOURNAL OF PEDIATRICS	38	656	17.26	15	1990
NEPHROLOGY	37	340	9.19	11	1998
PEDIATRIC TRANSPLANTATION	37	760	20.54	16	2001
JOURNAL OF PEDIATRICS	34	1996	58.71	23	1980
BMC NEPHROLOGY	33	264	8.00	10	2009
RENAL FAILURE	33	243	7.36	10	1990
IRANIAN JOURNAL OF KIDNEY DISEASES	32	216	6.75	9	2009
FRONTIERS IN PEDIATRICS	31	316	10.19	10	2014

NP = Number of publications, TC = Total citations, TC/NP = Citations per paper, PY_start = Publication year starting,

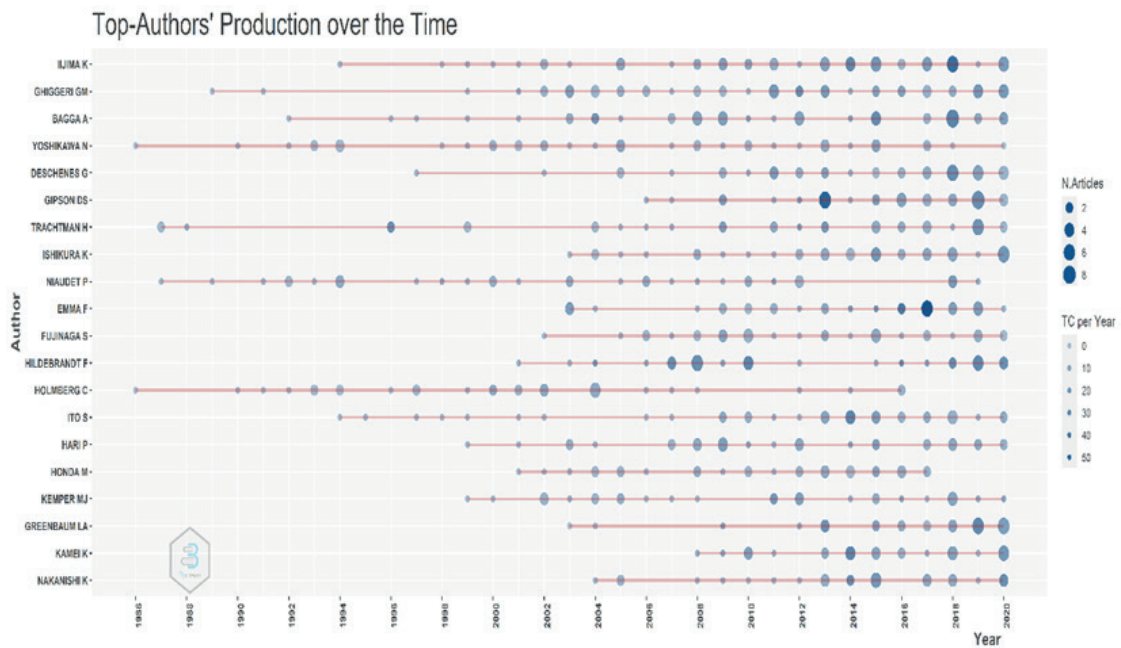


Figure 3. The 20 Most Influential Authors

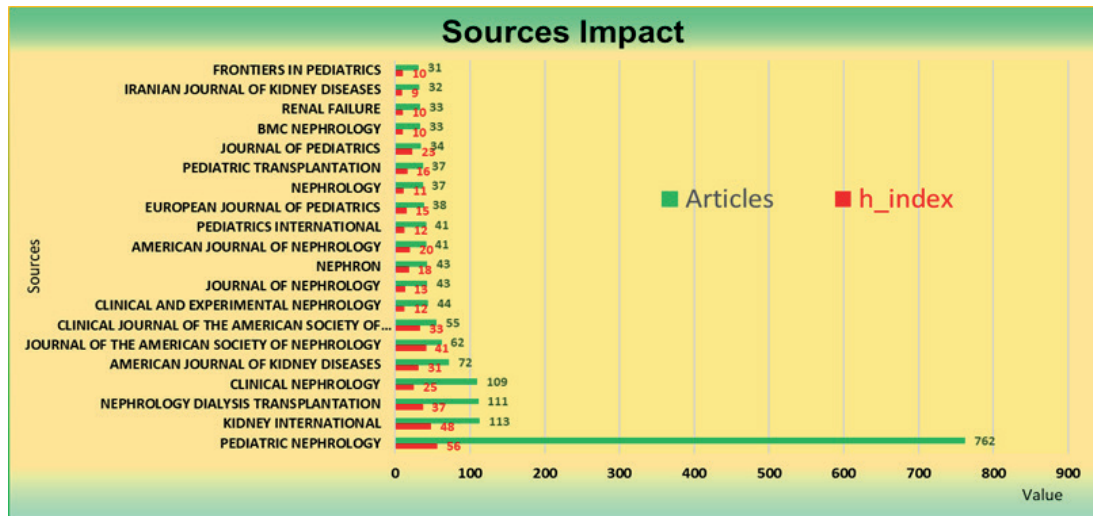


Figure 4. The 20 Most Impactful Journals

70.44 citations per article. The h index of the Clinical Journal of the American Society of Nephrology, which started its publication life in 2006, is 33, the number of citations of the journal is 3128, and the number of publications is 55. These values show that the journal has become influential in its field very quickly.

CONTENT ANALYSIS OF PNS SUBJECT

In this section, keyword analysis and citation analysis are used to identify key concepts of the PNS research topic.

Keyword Analysis

The authors use keywords in articles as a summary of the research. Keywords are expected to represent the research article. For this reason, the themes related to the research subject are determined by keyword analysis (19).

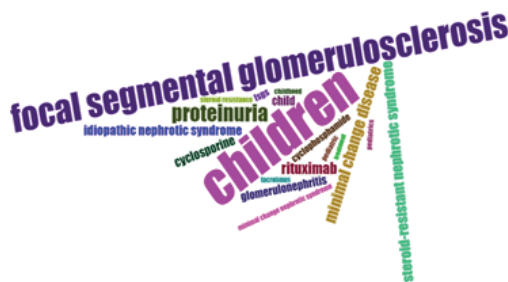
Frequency Analysis for Keywords

The keyword frequency (repeat count) of the PNS topic was analyzed with Bibliometrix, and a word cloud was created (Figure 5).

In Figure 5, the most common keywords of the top 20 authors are visualized. The size of the keywords is directly proportional to the frequency of their appearance in the dataset. The most used keywords are “Nephrotic Syndrome” and “Children.” On the other hand, keywords such as “focal segmental glomerulosclerosis,” “proteinuria,” “minimal change disease,” and “rituximab” draw attention to the word cloud. The number of usages of the most used keywords can be seen on the right side of the figure.

Trend Analysis of Keywords

The change and direction trends of the keywords over the years are presented in Figure 6. The keywords of



Terms	Frequency
Nephrotic syndrome	1128
Children	438
Focal Seg. Glomerulosclerosis	292
Proteinuria	179
Minimal Change Disease	131
Rituximab	122
Steroid-resist. Neph. Syn.	116
Idiopathic Neph. Syn.	108
Cyclosporine	102
Child	96
Glomerulonephritis	94
Cyclophosphamide	77

Figure 5. Word Cloud of the Keywords and Frequency in the PNS Research Area

the first ten authors were examined. The keywords nephrotic syndrome, children, and focal segmental glomerulosclerosis have been increasingly used since 1990. The graphs in Figure 6 show the change in the frequency of usage of 10 keywords and the years in which the keywords were used more frequently. While the keywords ciclosporin, cyclosporine-a, and beta (2)-microglobulin were used more frequently in the articles in the 1990s, the keywords “genetic testing,” “population pharmacokinetics,” and “steroid-resistant nephrotic syndrome (srns)” became more common after 2000.

Thematic Development Analysis

The thematic development of PNS research was analyzed from a dynamic perspective to cover the years 1980 to 2020. The strategic diagrams of the PNS subject in each sub-period are presented in Figure 7.

Keywords for 2018-2020:

- Motor Themes: pediatrics and child,
- Highly Developed and Isolated Themes: idiopathic nephrotic syndrome and pediatrics

- Emerging or Declining Themes: nphs (gene caused nephrotic syndrome) and proteinuria
- Basic and Transversal Themes: nephrotic syndrome and focal segmental glomerulosclerosis.

In addition to the four-term Thematic Map, the four-term Thematic Evolution Mapping, presented in Figure 8, was conducted to evaluate the development and change of PNS themes over the years.

The principles in Figure 7 were used while producing the Thematic Evolution Map in Bibliometrix. When the diagram is examined, it can be seen that there are nine themes in the first period, nine themes in the second period, eight themes in the third period, and nine themes in the last period. The node’s width is proportional to the size of the linked keywords. Although Nephrotic Syndrome is present in all four periods, it is linked with more keywords in 2011-2016.

Citation Analysis

Citation analysis was performed to determine the citations of the articles on PNS and their relationships. Table 4 shows the citations received by the articles.

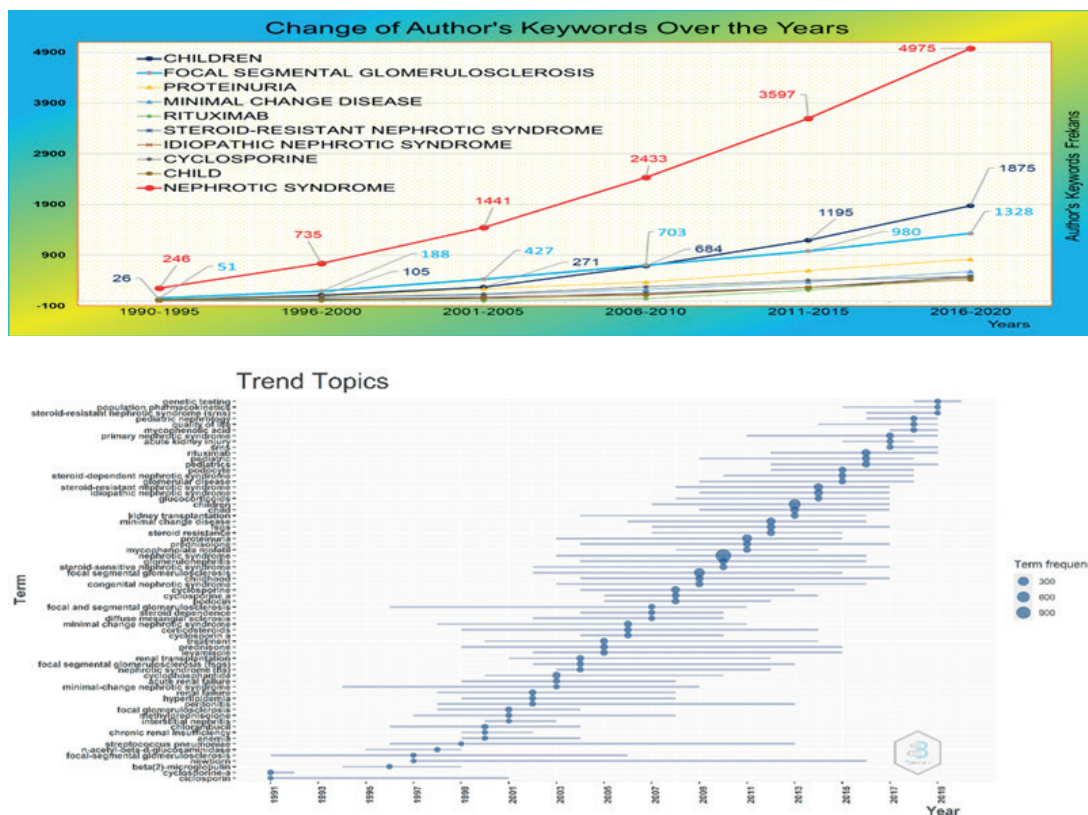


Figure 6. Change and Direction of the Keywords in the PNS Subject by Keyword Frequency

Table 4. Citation Analysis

Document	YP	LC	LC/YYP%	GC	GC/YYP%	LC/GC %
Eddy AA, 2003, Lancet	2003	273	15.167	481	26.722	56.76
Savin VJ, 1996, New Engl j Med	1996	152	6.080	561	22.440	27.09
Tarshish P, 1997, J Am Soc Nephrol	1997	151	6.292	218	9.083	69.27
Ruf RG, 2004, J Am Soc Nephrol	2004	142	8.353	306	18.000	46.41
Hinkes BG, 2007, Pediatrics	2007	125	8.929	283	20.214	44.17
Ponticelli C, 1993, Kidney Int	1993	118	4.214	241	8.607	48.96
Ingulli E, 1991, Pediatr Nephrol	1991	103	3.433	173	5.767	59.54
Trompeter RS, 1985, Lancet	1985	98	2.722	142	3.944	69.01
Bonilla-Felix M, 1999, Kidney Int	1999	96	4.364	142	6.455	67.61
Gipson DS, 2009, Pediatrics	2009	91	7.583	161	13.417	56.52
Srivastava T, 1999, Pediatr Nephrol	1999	90	4.091	139	6.318	64.75
Ehrich JHH, 1993, Eur J Pediatr	1993	89	3.179	132	4.714	67.42
Iijima K, 2014, Lancet	2014	87	12.429	187	26.714	46.52
Mckinney PA, 2001, Pediatr Nephrol	2001	86	4.300	120	6.000	71.67
Lombel RM, 2013, Pediatr Nephrol-A	2013	86	10.750	140	17.500	61.43
Cattran DC, 1999, Kidney Int	1999	84	3.818	234	10.636	35.90
Fornoni A, 2011, Sci Transl Med	2011	82	8.200	303	30.300	27.06
Gulati A, 2010, Clin J Am Soc Nephro	2010	80	7.273	133	12.091	60.15
Tejani A, 1988, Kidney Int	1988	79	2.394	154	4.667	51.30
Latta K, 2001, Pediatr Nephrol	2001	79	3.950	146	7.300	54.11

Year of Publication (YP), Local Citations (LC), YYP= Year 2020-Year of Publication, Global Citations (GC)

The article titled “Nephrotic syndrome in childhood,” written by Eddy AA and published in The Lancet journal in 2003 was determined to be the most impactful article on PNS. Moreover, another concept developed for the evaluation of most-cited authors is the Local Citation Percentage (LG/GC %). According to the percentage of local citations, the most influential publication with a value of 71.67% belongs to the article “Time trends and ethnic patterns of childhood nephrotic syndrome in Yorkshire, UK” written by Mckinney PA in 2001 and published in the journal Pediatric Nephrology.

DISCUSSION

Articles on PNS started to be published in the 80s, and the number of publications increased during the 90s. It has been seen that the USA, which is the world leader in the academic field, is also the leader in PNS subject. The USA is followed by China, Japan, and India. When all medical literature is considered, while the USA, China, England, and Germany rank first in the world, Turkey ranks 16th. However, it is noteworthy that Turkey ranks sixth in front of countries such as Germany and England in the subject of PNS. However, the situation is different when it comes to multiple country publications with the participation of authors from different countries. Turkey

and Japan are far behind other countries, and the most successful country in Canada in the field of multiple country publications (20).

It is seen that the author who contributed the most to the subject of PNS is Professor Arvind Bagga, who is a fellow at the All India Institute of Medical Sciences. He has a long academic career that started in the 90s. His specialty is pediatric nephrology. Professor Arvind Bagga is also the leader in the H and G indexes. The most cited author is Friedhelm Hildebrandt, a professor at Harvard Medical School specializing in pediatric nephrology. Debbie Sue Gipson started her publishing life in 2006, and her specialty is pediatric nephrology. She is the youngest of the 20 most impactful scientists. Despite her young age, she has very high index values compared to other authors. This situation is also reflected in the m-index values used to compare researchers who have different lengths of publication times. Gipson has one of the highest m-index values among 20 researchers.

Pediatric Nephrology is the journal that publishes the most significant number of articles in the field of PNS. This journal is followed by Kidney International and Nephrology Dialysis Transplantation. The ranking does not change even when the H-index value is

considered. The Journal of the American Society of Nephrology, on the other hand, is among the influential journals with a high h index, despite the lower number of articles published. Although the Clinical Journal of the American Society of Nephrology and Clinical and Experimental Nephrology have just started their publication life compared to other journals (2006 and 2008, respectively), they draw attention as influential journals.

Pediatric Nephrology is a journal of the International Pediatric Nephrology Association. Kidney International and Nephrology Dialysis Transplantation is an official journal of the International Society of Nephrology and the European Renal Association, respectively. Clinical Journal of the American Society of Nephrology and Clinical and Experimental Nephrology is an official journal of the American Society of Nephrology and the Japanese Society of Nephrology.

According to the analysis results, “Nephrotic Syndrome” and “Children” are the most frequently used keywords. In addition to these, focal segmental glomerulosclerosis, proteinuria, minimal change disease, and rituximab are other frequently used keywords. Since “Nephrotic Syndrome” and “Children” terms are significantly related to PNS, it is expected to obtain them as the most frequently used keywords.

The most common form of nephrotic syndrome in children is idiopathic nephrotic syndrome. Idiopathic nephrotic syndrome accounts for 90 percent of cases between the ages of 1-and 10 and 50 percent after the age of 10. Idiopathic nephrotic syndrome is defined by minimal change disease, focal segmental glomerulosclerosis, and diffuse mesangial proliferation on the microscope. In children, focal segmental glomerulosclerosis represents about 20% of nephrotic syndrome. The response frequency to treatment is 50% in patients with diffuse mesangial proliferation and 30% in patients with focal segmental glomerulosclerosis. It has been evaluated that these features are the reason why the keywords focal segmental glomerulosclerosis and minimal change disease are used more frequently than others (21).

Steroid dependence and/or frequent relapses are seen during or after immunosuppressive treatments in more than 20% of children with idiopathic nephrotic syndrome. Resistance to steroids and all immunosuppressive agents has been reported with a frequency of approximately 3% in childhood idiopathic nephrotic syndrome. This picture is called refractory steroid-resistant nephrotic syndrome. This syndrome is known for its high risk of end-stage renal disease. Rituximab, an anti-CD20 monoclonal antibody, is effective in steroid-

dependent, relapsing, and refractory steroid-resistant nephrotic syndromes. Its initial approval was in 1997. Studies conducted between 2006 and 2010 found that rituximab treatment cured complex childhood idiopathic nephrotic syndrome. This explains the frequent use of rituximab in articles since the mid-2000s (22,23).

Cyclosporine and cyclosporine A are the most commonly used immunosuppressant agents in organ transplantation. These agents are also used in the treatment of steroid-resistant nephrotic syndrome. They came into use in the late '90s. Beta-2 microglobulin is used as a biomarker in patients with nephrotic syndrome. The molecule was chosen for investigation in the mid-1980s and 1990s as a non-creatinine renal filtration marker. Because of these features mentioned above, these keywords were widely used in the 90s (24–26).

Genetic testing, population pharmacokinetics, and steroid-resistant nephrotic syndrome are frequently used keywords after 2000. The reasons for this have been examined, and it was seen that although the pathogenesis of the nephrotic syndrome is not clear, cloning studies in congenital nephrotic syndrome identified several mutations. These mutations are in NPHS1 or nephrin, the unknown gene. Subsequent studies identified mutations named slit diaphragm protein NPHS2 (podocin). A relatively common cause of steroid-resistant nephrotic syndrome in childhood. In addition to these, population pharmacokinetics is the study of the sources and correlates of variability in drug concentrations among individuals, helping guide individualized dosing regimens. It was seen that studies on this subject intensified in the 90s, and after 2000, studies on population pharmacokinetics of agents used in nephrotic syndrome were conducted. This information explains the dynamics of the frequency of use of keywords in the period after 2000 (27–29).

PNS studies were examined by thematic developmental analysis. The dynamics related to the keywords in the strategic diagrams in each sub-period are explained above.

The article titled “Nephrotic syndrome in childhood,” published by Eddy AA in the Lancet Journal in 2003 is the most influential article on PNS. The article’s subject gives general information about childhood nephrotic syndrome, and its publication in a prestigious journal such as The Lancet increases the number of citations. A multicenter, double-blind, randomized, placebo-controlled study of rituximab was published in The Lancet in 2014 by Kazumoto Iijima. This study has come to the fore among the studies in terms of being cited as much as the ones published years ago. The LC/

YYP% and GC/YYP% scores, which allow the article to be examined independently of the effect of publication years, are also relatively high. It is considered that the success of this article is that it examines such an important and current issue as rituximab.

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