

## **Bibliometric analysis of the most cited articles in urolithiasis**

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### **Abstract**

*Urolithiasis* is a common kidney disease affecting people in the world. The study aimed to carry out a bibliometric analysis of the most cited articles in *urolithiasis* and to identify the impact of research, active journals, productive country, and productive institution. The top most cited 100 publications indexed in the Scopus database were retrieved as study sample. The period of the study was limited up to the year 2019. The study gives an understanding of the global research trend and the impact of research publications among the scientific community. Twenty-five percent (25%) of the most cited articles were published between the years 2004 and 2007. The average citation per article was 542. The United States was the most productive country in the world regarding the research in this field. The Emory University of Atlanta in the United States was the highest contributing institution on *urolithiasis* research. Internationally more prominent weekly published general medical journals such as New England Journal of Medicine and Lancet, were the most active journals publishing mostly cited articles in *urolithiasis*. The findings of this study is useful to the researchers, who involve in research in *urolithiasis*. The study provides intellectual milestones in *urolithiasis* research reflecting the characteristics of the most cited published literature.

**Keywords:** Bibliometric analysis, Citation, Urolithiasis research, Kidney stone diseases.

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## **Introduction**

*Urolithiasis* refers to the presence of calculi anywhere along the course of the urinary tracts. It also commonly known as kidney stone disease, is the formation of stones anywhere in the urinary tract (Tiselius, 2003). It is one of the most common diseases affecting many people around the world. “Sri Lanka has experienced an escalating incidence of kidney stone diseases of unknown aetiology in dry zones. The incidence of kidney diseases is highest in the North Central Province(NCP). However, in recent years, the disease has spread into areas adjacent to as well as distant from the NCP.”(Wimalawansa, 2014).*Urolithiasis* research in Sri Lanka received increased attention and interest among many researchers as many people are affected by this disease.

Bibliometrics can be defined as the statistical evaluation of the published documents (Sengupta, 1990). It can be expressed as a statistical analysis of the bibliographic information of publications. “ Bibliometric analyses are based on the assumption that most scientific discoveries and research results eventually are published in international scientific journals where they can be read and cited by other researchers.” (Rehn, et-al.,2014)

The citation of a scholarly article is an indicator of the impact of the research on the scientific community. Bibliometric analysis of most cited research articles will provide useful findings on the relevant topic (Rehn, et-al.,2014).There are many bibliometric studies being carried out in different clinical fields such as pain research (Chuang,, & Ho, , 2014), breast cancer, ÖzenÇınar, 2020), gestational diabetes mellitus (Iftikhar, et-al, 2019) and rhinoplasty (Sinha, et-al, 2016). Mohammed et al (2017) did a bibliometric study of 100 most selected articles on Computed Tomographic Colonography (CTC). The study identified the characteristics and quality of published literature on CTC research. Further the research identified the most influential publications and authors to date in CTC. Bibliometric analysis of top most cited articles in neuroimaging focused on the historical development of research on neuroimaging and important advances in this field( Kim et al, 2016). The 100 most cited articles on neuro critical care was analysed.(Ramos, et al, 2019). The study provided the trend and scope of the research production in the field of neuro critical care. Based on the literature no bibliometric study was conducted in the field of

*urolithiasis*. This study guides the global trend and the scope of the research activities in *Urolithiasis*.

## **Objectives**

The main objective of the research was to perform a bibliometric analysis in research articles published in *urolithiasis* and to evaluate the trend and impact of research in this field. It revealed the impact of research, growth of research with year, country collaboration, active journals, productive institution, and productive country in *urolithiasis* research.

## **Methodology**

The research method of the study was a bibliometric analytical method, which adapts to the detailed analytical method of secondary data. The data for the study were retrieved from the Scopus database on the 20<sup>th</sup> of May 2020. The basic search method was used with the search terms of “Urolithiasis” OR “Kidney stone ” OR “Urinary stones” OR “Nephrolithiasis” OR “Renal calculi” to retrieve the articles published in *urolithiasis*. The document type was limited to only articles indexed in the Scopus database and the period was limited from the beginning to the year 2019.

There were a total of 36,461 indexed articles retrieved from the database. The articles were sorted from higher to lower based on the citation count. Bibliographic details of 100 most cited articles were selected as a sample for the analysis of the study. Most cited articles were selected based on the citations reported by the Scopus database. Impact factor (IF) in 2018 of the top most-cited journals was retrieved from the InCites Journal Citation Reports (JCR) websites in the latter part of May 2020. Authorship pattern was analysed by using the distribution of co-authorship. The degree of collaboration was calculated by using the formula given by Subramanyam (1983). The selected data were analyzed using Microsoft excel 2007 in terms of bibliometric parameters. The variables used in the study were the titles of most cited articles, the number of citations, year of publication, names of authors, the country affiliation of the authors, and journals publishing leading articles. The analyzed data was presented in descriptive methods.

## Results and Discussion

A total of 36,461 articles was retrieved from the database. These were published in 37 different languages from a total of 156 countries globally. But all the selected most cited articles were published in English language. Citation count ranges from 301 to 1623. The average citation per article was 542.

In authorship analysis, only three articles were single-authored whereas seven articles were authored by more than 20 authors and 27 articles were authored by 10 -18 authors. The degree of collaboration was 0.97, indicating that multi-authored research papers, which means collaborative research activities, lead the prominent position in *urolithiasis* research (Table 1).

Table 1: Authorship pattern

Number of authors	Frequency
Single author	03
2-4	30
5-10	42
11-15	13
16-20	05
Above 20	07

Year of publication of selected most cited 100 articles ranged from the year 1967 to 2017. The highest number of articles were published in 2004 (n=11), which was followed by 2010 (n=10). More research publications were published after the year 2002. Figure 1 shows the cumulative growth of publications with year. Twenty-five percent (25%) of articles were published between 2004 and 2007.

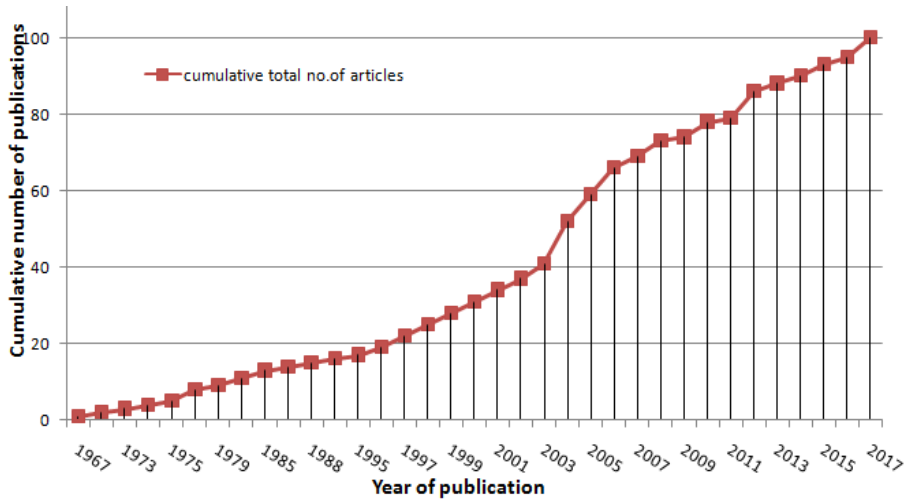


Figure 1: Trend in year wise growth of research publications in *urolithiasis*

All 100 selected top articles were published in a total of 47 different journals. Table 2 shows a list of top 10 publications with the details of the number of citations, first author, publication year, and title of the journal. The top most cited article was titled as ‘Treatment with indinavir.....’ published in year 1997 in the journal of New England journal of medicine by Gulick et al (1997) received 1623 citations.

Among the analyzed 100 articles, 63% of the total citations (n=54,228) were from the top ten articles (n=33,997). Thirty-seven (37) articles were published in four journals. New England Journal of Medicine (NEJM) was the most popular journal among the 47 journals, which contributed 19 articles with a total citation of 12,596. It was followed by the journal titled Lancet (n= 11) (Table 3), Among the listed ten journals, only three journals are in the discipline of urology and all other journals are from general medicine, The impact factor of general medicine journals such as Lancet, New England journal of medicine are usually higher than the subject specified journals because it has more number of readers than subject specified journals. More articles were published on subject specified journals on urology when considering the total population of the retrieved articles. Journal of urology (2333 articles), Urology (1156 articles), Journal of endourology (1144 articles) Urological research (710 articles), and British journal of urology (583 articles) were the leading journals on *urolithiasis* based on the number of articles

indexed in Scopus database. The information is useful to the researchers involving in *urolithiasis*.

Table 2: Details of top ten most cited publications in *urolithiasis* research.

First Author	No.of authors	Title	Year	Source title	Cited by
Gulick R.M.,	14	Treatment with indinavir, zidovudine, and lamivudine in adults with human immunodeficiency virus infection and prior antiretroviral therapy.	1997	NEJM	1623
Vos T.,	More than >50	Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016.	2017	The Lancet	1467
Schauer P.R.,	9	Bariatric surgery versus intensive medical therapy in obese patients with diabetes.	2012	NEJM	1370
Atala A.,	5	Tissue-engineered autologous bladders for patients needing cystoplasty.	2006	Lancet	1315
Jackson R.D.	13	Calcium plus vitamin D supplementation and the risk of fractures.	2006	NEJM	1300
Naghavi M.,	More than >50	Global, regional, and national age-sex specific mortality for 264 causes of death, 1980-2016: A systematic analysis for the Global Burden of Disease Study 2016.	2017	The Lancet	1294
Scales Jr. C.D.,	4	Prevalence of kidney stones in the United States	2012	European Urology	1040

Stamatelou K.K.,	5	Time trends in reported prevalence of kidney stones in the United States: 1976-1994.	2003	Kidney International	995
Greenstein A.J.,	3	The extra-intestinal complications of Crohn's disease and ulcerative colitis: A study of 700 patients.	1976	Medicine (United States)	978
Schauer P.R.,	11	Bariatric surgery versus intensive medical therapy for diabetes - 3-Year outcomes	2014	NEJM	935

Table 3: Top ten productive journals in *urolithiasis* research based on citation count.

Source title	Number of articles	Total citation	2018 IF
New England Journal of Medicine	19	12596	70.67
Lancet	11	8986	59.102
Journal of Urology	9	3774	5.647
Kidney International	4	2004	0.902
European Urology	3	1841	17.298
Journal of Clinical Investigation	3	1304	10.51
Annals of Internal Medicine	2	1250	19.315
Journal of the American Medical Association	2	1244	51.273
Nature	2	998	4.011

In the analysis of the productive country, 482 authors were from the United States. The study identified that globally, the leading role in *urolithiasis* research was from the United States and it was followed by United Kingdom (89 authors), Australia (82 authors), Iran (53 authors) and India (51 authors). The Emory University of Atlanta in the United States was the highest contributing institution in *urolithiasis* research.

Most commonly used keywords with the number of times indexed on publications of *urolithiasis* by the Scopus database were Nephrolithiasis (21085), Urolithiasis (16374), Kidney calculi (12694), Urinary

calculi (7775), Kidney(7018), Calcium (4647) lithotripsy (4218) and calcium oxalate (3529). These keywords can be used to retrieve information on *urolithiasis* from the Scopus database. The study identified the overall trend in *urolithiasis* globally. The study presents some limitations too. Data of the study were retrieved only from a single database(Scopus). The retrieved data depends on the accuracy of the search terms. Further studies are needed, collecting data with more databases to get a better profile of bibliometric analysis.

## **Conclusions**

The results of the study are useful to the scientific community which involves research activities in *urolithiasis*. The study identified the global trend in research studies in *urolithiasis*. The study showed that research in the field of urolithiasis was significantly increased after the year 2000. Findings of the analysis revealed that multi-authored articles; cooperative research work was in a prominent position. With respect to the country productivity, the United States was the most impactful region of the world regarding the research in this field. The Emory University of Atlanta in the United States was the highest contributing institution on *urolithiasis* research. Most cited papers were published in high IF general medical journals. The most productive journal in the study was New England Journal of Medicine, which is a weekly general medical journal and published 19 articles with a total citation of 12,596. The findings of the study supports to predict the future research activities in the subspeciality of *urolithiasis*.

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