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A bibliometric analysis of the 100 most influential papers on peritoneal dialysis

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Abstract

Background: We aimed to identify the 100 most cited articles published on peritoneal dialysis (PD) and analyze their characteristics to provide information on the achievements and developments of PD research over the past decades.

Methods: The Science Citation Index Expanded (SCIE) in the Web of Science Core Collection was comprehensively searched from 2000 to 2018, using the keywords "Peritoneal dialysis" or "Dialyses, Peritoneal" or "Dialysis, Peritoneal" or "Peritoneal Dialyses". The top 100 cited articles were retrieved by reading titles and abstracts. Significant information was further elicited, including the authors, journals, countries, institutions, and publication year.

Results: The United States was the most productive country (n = 51), Li Pkt published the highest number of papers (n = 7), the Journal of the American Society of Nephrology produced the highest number of contributions (n = 28), and Baxter International Inc., the University of California System, and the University of Toronto were the institutions with the highest number of articles (n = 10).

Conclusions: This is the first bibliometric study to identify the most influential papers in PD research. This report describes the major changes and advances in research regarding PD as a guide for writing a citable article.

Abbreviations: GFR = glomerular filtration rate, PD = peritoneal dialysis, SCIE = Science Citation Index Expanded.

Keywords: bibliometric analysis, citation, nephrology, peritoneal dialysis

1. Introduction

According to the latest global report, The Global Kidney Health Atlas, almost 1 in 10 people in the world suffer from chronic kidney disease. Individuals with terminal chronic kidney disease, which means those with a glomerular filtration rate < 15 ml/minutes/1.73 m^2 require some type of therapy to replace renal function.[1] This therapy can include one of the available dialysis modalities, peritoneal dialysis or hemodialysis, or kidney transplantation. As compared to hemodialysis, PD is home-based, cost-effective, preserves residual renal function therapy for patients with terminal chronic kidney disease, and may yield better short-term outcome after transplantation.[2] PD is a renal replacement therapy based on infusing a sterile solution into the peritoneal cavity through a catheter, using the peritoneal membrane as the dialysing surface, and provides for the removal of solutes and water.[3] This solution is packaged in clear flexible plastic bags, which is in close contact with the capillaries in the peritoneum. Because it is hyperosmolar to plasma due to the addition of osmotic agents, it allows the transportation of diffusion solute and the loss of osmotic ultrafiltration water. There is an increasing number of related articles on PD, improving peritoneal function, reducing the occurrence of peritonitis, and improving the quality of life of dialysis patients. However, there is still a lack of knowledge about the quality of scientific production in this field.

The citation number of an article is often used to assess the academic impact of research. There is a unique tool called bibliometric analysis that analyzes the characteristics and quality of published articles. It was first published in Journal of the American Medical Association (JAMA) in 1987 and has been widely used in various fields to assess and evaluate the importance of published articles or research trends.[4–6]

With this fact in mind, this study used the database to rank the 100 most cited papers to determine published papers in the most frequently cited medical journals by other authors. By analyzing the characteristics of these papers, we intended to determine which qualities make PD papers important to the profession.

2. Methods

2.1. Search strategy and criteria

On Feb 1, 2020, authors comprehensively searched relevant studies on the Science Citation Index Expanded (SCIE) database

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The authors reported no conflicts of interest.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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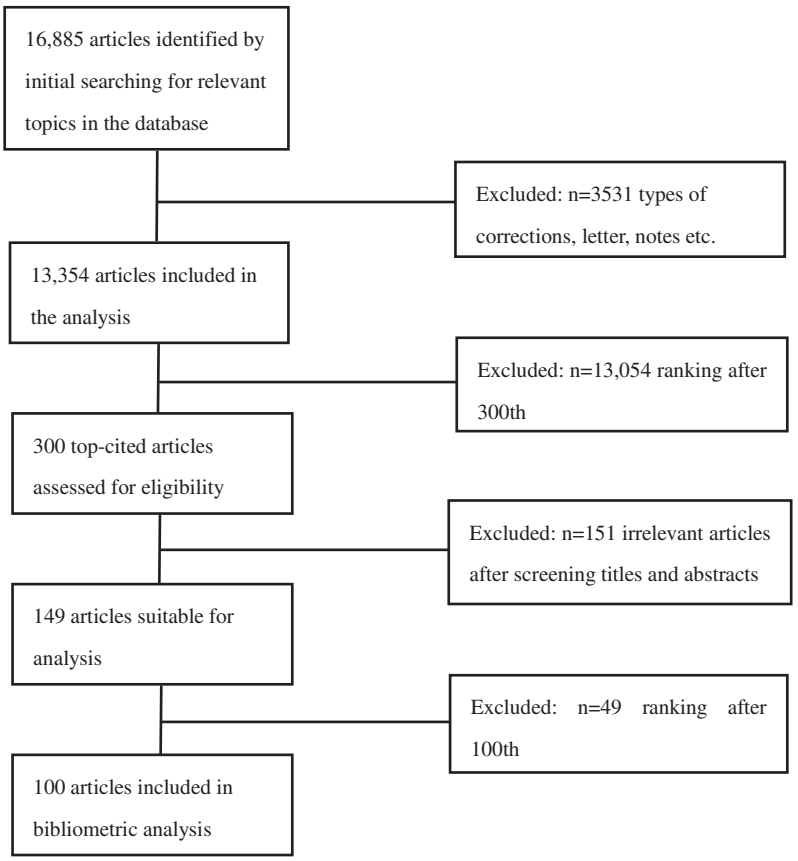

Figure 1. Flowchart illustrating the paper collection process.

of Web of Science Core Collection. The searching strategy is "TS=(Peritoneal dialysis OR Dialyses, Peritoneal OR Dialysis, Peritoneal OR Peritoneal Dialyses)". And the language was restricted in English. Then we excluded papers by literature type, only article, review, proceedings were included. Third, irrelevant articles were excluded after screening titles and abstracts and articles were further ranked in descending order of citations. Finally, the 100 most cited articles were included in this analysis (Fig. 1).

2.2. Data extraction

All articles were reviewed by 2 independent well-trained investigators. The following information was listed for 100 cited articles: the journal name, publication year, and overall citation rate (total citations/average citations/2019 citations). The ethical approval was waived, as no patients or animals were involved in this study.

3. Results

3.1. The top 100 articles

As shown in Figure 1, a total of 16,885 articles focusing on PD were identified from the database. The number of publications concerning PD had an annually significant increase worldwide. The top 100 cited articles are listed in Table 1. The most cited article, a prospective, randomized, controlled trial study, was published in the Journal of the American Society of Nephrology in 2002, and this paper was cited a total of 733 times and 21 times in 2019. The average citation times per year of this article were 43.12. Each of the top 100 cited articles was cited no less than 150 times.

3.2. Countries that contributed more than 5 articles to the top 100 articles

As listed in Table 2, the United States was the most productive country, with 51 articles, followed by Canada with 19 articles, England with 11 articles, Netherlands with 10 articles, China with 10 articles, Germany with 8 articles, and Spain with 7 articles. Moreover, the United States had the highest total citation times and mean citation times in 2019, but Spain had the highest mean citation times per article, with 334.43 citation times.

3.3. The authors who contributed more than 5 articles in the top 100 articles

With respect to the authors listed in Table 3, Li Pkt was the most productive author, with 7 articles, followed by Fink Ne, Piraino B, and Powe Nr, with 6 articles. Moreover, Fink Ne had the highest total citation times and mean citation times in 2019, but Piraino B had the highest mean citation times per article, with 335 citation times.

Table 1

The top 100 most cited papers in PD.

Rank	Paper	Year	Total citations	Average citations per paper	Citation (2019)
1	Effects of increased peritoneal clearances on mortality rates in peritoneal dialysis: ADEMEX, a prospective, randomized, controlled trial	2002	733	43.12	21
2	Morphologic changes in the peritoneal membrane of patients with renal disease	2002	708	41.59	33
3	Peritoneal dialysis-related infections recommendations: 2010 update	2010	642	71.11	34
4	Relative contribution of residual renal function and peritoneal clearance to adequacy of dialysis: A reanalysis of the CANUSA study	2001	595	33	34
5	Peritoneal dialysis-related infections recommendations: 2005 update	2005	576	41	8
6	Peritoneal dialysis and epithelial-to-mesenchymal transition of mesothelial cells	2003	518	32.19	33
7	Survival advantages of obesity in dialysis patients	2005	433	30.64	22
8	Predictors of loss of residual renal function among new dialysis patients	2000	384	20.16	20
9	Quality of life in end-stage renal disease patients	2001	338	18.78	17
10	A simple comorbidity scale predicts clinical outcomes and costs in dialysis patients	2000	335	17.53	13
11	Cost analysis of ongoing care of patients with end-stage renal disease: The impact of dialysis modality and dialysis access	2002	321	18.82	17
12	Cinacalcet HCl, an oral calcimimetic agent for the treatment of secondary hyperparathyroidism in hemodialysis and peritoneal dialysis: A randomized, double-blind, multicenter study	2005	310	22.14	13
13	Cardiac valve calcification as an important predictor for all-cause mortality and cardiovascular mortality in long-term peritoneal dialysis patients: A prospective study	2003	303	18.94	10
14	Effect of fluid and sodium removal on mortality in peritoneal dialysis patients	2001	302	16.78	8
15	The Euro-Balance Trial: The effect of a new biocompatible peritoneal dialysis fluid (balance) on the peritoneal membrane	2004	295	19.67	6
16	Interleukin-6 is an independent predictor of mortality in patients starting dialysis treatment	2002	295	17.35	17
17	Peritoneal glucose exposure and changes in membrane solute transport with time on peritoneal dialysis	2001	291	16.17	7
18	Survival of functionally anuric patients on automated peritoneal dialysis: The European APD Outcome Study	2003	282	17.63	16
19	National Kidney Foundation K/DOQI clinical practice guidelines for nutrition in chronic renal failure	2001	274	15.17	34
20	Validation of comorbid conditions on the end-stage renal disease medical evidence report: The CHOICE study	2000	271	14.21	10
21	Similar Outcomes with Hemodialysis and Peritoneal Dialysis in Patients with End-Stage Renal Disease	2011	267	33	24
22	Adult peritoneal dialysis-related peritonitis treatment recommendations: 2000 update	2000	263	13.84	1
23	Quantifying comorbidity in peritoneal dialysis patients and its relationship to other predictors of survival	2002	262	15.41	20
24	Adapting the Charlson Comorbidity index for use in patients with ESRD	2003	261	16.25	24
25	Changes in serum calcium, phosphate, and PTH and the risk of death in incident dialysis patients: A longitudinal study	2006	260	19.85	7
26	Icodextrin improves the fluid status of peritoneal dialysis patients: Results of a double-blind randomized controlled trial	2003	257	16	6
27	Global Trends in Rates of Peritoneal Dialysis	2012	256	36.43	46
28	Transient overexpression of TGF-beta 1 induces epithelial mesenchymal transition in the rodent peritoneum	2005	254	18.07	14

(*continued*)

Table 1
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Rank	Paper	Year	Total citations	Average citations per paper	Citation (2019)
29	Associations of serum fetuin-A with malnutrition, inflammation, atherosclerosis, and valvular calcification syndrome and outcome in peritoneal dialysis patients	2005	246	17.57	14
30	The differential impact of risk factors on mortality in hemodialysis and peritoneal dialysis	2004	246	16.33	8
31	Effect of starting with hemodialysis compared with peritoneal dialysis in patients new on dialysis treatment: A randomized controlled trial	2003	244	15.19	14
32	Mortality and hospitalization in hemodialysis patients in five European countries: results from the Dialysis Outcomes and Practice Patterns Study (DOPPS)	2004	241	16.07	12
33	Initial survival advantage of peritoneal dialysis relative to hemodialysis	2002	241	14.18	3
34	Epithelial-to-mesenchymal transition and peritoneal membrane failure in peritoneal dialysis patients: Pathologic significance and potential therapeutic interventions	2007	233	19.25	21
35	Health economic evaluations: The special case of end-stage renal disease treatment	2002	232	13.65	10
36	Aspirin, beta-blocker, and angiotensin-converting enzyme inhibitor therapy in patients with end-stage renal disease and an acute myocardial infarction	2003	229	14.31	12
37	Comparing the risk for death with peritoneal dialysis and hemodialysis in a national cohort of patients with chronic kidney disease	2005	227	16.07	11
38	Depression in patients with chronic renal disease – What we know and what we need to know	2002	227	13.29	13
39	The relative importance of residual renal function compared with peritoneal clearance for patient survival and quality of life: An analysis of the Netherlands Cooperative Study on the Adequacy of Dialysis (NECOSAD)-2	2003	226	14.13	11
40	Restriction of dietary glycotoxins reduces excessive advanced glycation end products in renal failure patients	2003	226	14.13	10
41	Differences in quality of life across renal replacement therapies: A meta-analytic comparison	2000	225	11.84	5
42	Encapsulating peritoneal sclerosis in Japan: A prospective, controlled, multicenter study	2004	221	14.73	11
43	Left Ventricular Mass in Chronic Kidney Disease and ESRD	2009	218	21.4	17
44	Encapsulating peritoneal sclerosis: Definition, etiology, diagnosis, and treatment	2000	218	11.47	9
45	Hemodialysis and peritoneal dialysis: Comparison of adjusted mortality rates according to the duration of dialysis: Analysis of the Netherlands Cooperative Study on the Adequacy of Dialysis 2	2003	204	12.75	11
46	Propensity-Matched Mortality Comparison of Incident Hemodialysis and Peritoneal Dialysis Patients	2010	202	22.11	15
47	Relationship between Dialysis Modality and Mortality	2009	200	20	13
48	Warfarin Use and the Risk for Stroke and Bleeding in Patients with Atrial Fibrillation Undergoing Dialysis	2014	199	39.4	27
49	Hepcidin-A Potential Novel Biomarker for Iron Status in Chronic Kidney Disease	2009	199	19.9	16
50	Progressive vascular calcification over 2 years is associated with arterial stiffening and increased mortality in patients with stages 4 and 5 chronic kidney disease	2007	199	16.58	15
51	Body mass index, dialysis modality, and survival: Analysis of the United States Renal Data System Dialysis Morbidity and Mortality Wave II Study	2004	199	13.27	8

(*continued*)

Table 1

(continued).

Rank	Paper	Year	Total citations	Average citations per paper	Citation (2019)
52	Effects of an angiotensin-converting renal function in patients receiving enzyme inhibitor on residual peritoneal dialysis – A randomized, controlled study	2003	199	12.44	6
53	Long-term clinical effects of a peritoneal dialysis fluid with less glucose degradation products	2001	199	11.06	1
54	Inflammation, residual kidney function, and cardiac hypertrophy are interrelated and combine adversely to enhance mortality and cardiovascular death risk of peritoneal dialysis patients	2004	197	13.13	8
55	Inflammation is associated with carotid atherosclerosis in dialysis patients	2000	197	10.37	1
56	Decreased survival among sedentary patients undergoing dialysis: Results from the dialysis morbidity and mortality study wave 2	2003	195	12.19	19
57	Septicemia, access, and cardiovascular disease in dialysis patients: The USRDS Wave 2 Study	2005	192	13.71	12
58	Nasal carriage of Staphylococcus aureus and prevention of nosocomial infections	2005	191	13.64	11
59	Description of 12 cases of nephrogenic fibrosing dermopathy and review of the literature	2006	190	14.54	3
60	Successful treatment of calciphylaxis with intravenous sodium thiosulfate	2004	189	12.6	7
61	Patient ratings of dialysis care with peritoneal dialysis vs hemodialysis	2004	188	12.53	7
62	Hemofiltration and peritoneal dialysis in infection-associated acute renal failure in Vietnam	2002	188	11.06	4
63	ISPD position statement on reducing the risks of peritoneal dialysis-related infections	2011	187	23.38	21
64	Mortality studies comparing peritoneal dialysis and hemodialysis: What do they tell us?	2006	187	14.38	7
65	Patient education and access of ESRD patients to renal replacement therapies beyond in-center hemodialysis	2005	187	13.07	8
66	Gene transfer of transforming growth factor-beta to the rat peritoneum: Effects on membrane function	2001	187	10.39	4
67	Quality-of-life evaluation using short form 36: Comparison in hemodialysis and peritoneal dialysis patients	2000	187	9.84	6
68	Meta-analysis: Peritoneal membrane transport, mortality, and technique failure in peritoneal dialysis	2006	184	14.15	15
69	The kidney disease outcomes quality initiative (K/DOQI) guideline for bone metabolism and disease in CKD: Association with mortality in dialysis patients	2005	184	13.14	9
70	Pulmonary hypertension in patients with end-stage renal disease	2003	183	11.44	14
71	The effect of contraindications and patient preference on dialysis modality selection in ESRD patients in the Netherlands	2004	182	12.13	5
72	Evaluation and management of ultrafiltration problems in peritoneal dialysis	2000	181	9.42	10
73	The importance of residual renal function in dialysis patients	2006	179	13.77	20
74	Charlson comorbidity index as a predictor of outcomes in incident peritoneal dialysis patients	2001	178	9.89	8
75	Randomized, double-blind, placebo-controlled, dose-titration, phase III study assessing the efficacy and tolerability of lanthanum carbonate: A new phosphate binder for the treatment of hyperphosphatemia	2003	177	11.06	0
76	A randomized controlled trial of hemoglobin normalization with epoetin alfa in pre-dialysis and dialysis patients	2003	176	11	3
77	Importance of dialysis adequacy in mortality and morbidity of Chinese CAPD patients	2000	176	9.26	2
78	An evaluation of an integrative care approach for end-stage renal disease patients	2000	175	9.16	6

(*continued*)

Table 1
(continued).

Rank	Paper	Year	Total citations	Average citations per paper	Citation (2019)
79	Mortality differences by dialysis modality among incident ESRD patients with and without coronary artery disease	2003	173	10.81	2
80	Vascular proliferation and enhanced expression of endothelial nitric oxide synthase in human peritoneum exposed to long-term peritoneal dialysis	2000	171	9	2
81	A Systematic Review and Meta-Analysis of Utility-Based Quality of Life in Chronic Kidney Disease Treatments	2012	170	24.29	32
82	Hemodialysis Vascular Access Modifies the Association between Dialysis Modality and Survival	2011	170	21	12
83	Changes in quality of life during hemodialysis and peritoneal dialysis treatment: Generic and disease specific measures	2004	170	11.27	9
84	Peritonitis remains the major clinical complication of peritoneal dialysis: the london, uk, peritonitis audit 2002-2003	2009	168	16.6	18
85	Dialysis-associated systemic fibrosis (Nephrogenic fibrosing dermopathy) – Study of inflammatory cells and transforming growth factor beta 1 expression in affected skin	2004	165	16.3	2
86	Randomized, double-blind trial of antibiotic exit site cream for prevention of exit site infection in peritoneal dialysis patients	2005	164	11.64	9
87	Effect of Kt/V on survival and clinical outcome in CAPD patients in a randomized prospective study	2003	164	10.25	4
88	Effect of icodextrin on volume status, blood pressure and echocardiographic parameters: A randomized study	2003	164	10.25	4
89	Association of Residual Urine Output With Mortality, Quality of Life, and Inflammation in Incident Hemodialysis Patients: The Choices for Healthy Outcomes in Caring for End-Stage Renal Disease (CHOICE) Study	2010	162	18	24
90	Strict volume control normalizes hypertension in peritoneal dialysis patients	2001	162	9	4
91	Survival following parathyroidectomy among United States dialysis patients	2004	159	10.53	14
92	Prognostic value of ultrasonographic measurement of carotid intima media thickness in dialysis patients	2001	157	8.72	4
93	The impact of education on chronic kidney disease patients' plans to initiate dialysis with self-care dialysis: A randomized trial	2005	155	10.86	7
94	Nephrogenic fibrosing dermopathy: A novel cutaneous fibrosing disorder in patients with renal failure	2003	155	9.69	1
95	Effect of glucose degradation products on human peritoneal mesothelial cell function	2000	154	8.11	2
96	Peritonitis-related mortality in patients undergoing chronic peritoneal dialysis	2005	153	10.86	6
97	Impact of dialysis modality on survival of new ESRD patients with congestive heart failure in the United States	2003	153	9.56	2
98	Hope and advance care planning in patients with end stage renal disease: qualitative interview study	2006	152	11.69	11
99	What do American nephrologists think about dialysis modality selection?	2001	152	8.39	4
100	Staphylococcus aureus serves as an iron source for Pseudomonas aeruginosa during in vivo coculture	2005	150	10.57	14

Table 2

Countries that contributed more than 5 papers to the top 100 cited articles.

Country	Number of articles	Total citations	Average citations per article	Citation (2019)
USA	51	12,373	242.61	615
Canada	19	4684	246.53	323
England	11	2914	264.91	128
Netherlands	10	2876	287.6	108
China	10	2869	286.9	127
Germany	8	2611	326.38	88
Spain	7	2341	334.43	113

Table 3

Authors who contributed more than 5 articles in the top 100 most cited papers.

Author	Number of articles	Total citations	Average citations per article	Citation (2019)
Li Pkt	7	2339	334.14	82
Fink Ne	6	1278	213	68
Piraino B	6	2010	335	81
Powe Nr	6	1278	213	68

3.4. Top 5 sources that contributed the most papers to the top 100 articles

As shown in Table 4, the Journal of the American Society of Nephrology was the most popular journal, with 28 articles, followed by the American Journal of Kidney Diseases and Kidney International, with 17 articles, Peritoneal Dialysis International, with 8 articles, Nephrology Dialysis Transplantation, with 6 articles. The Journal of the American Society of Nephrology also had the highest total citation times and citation times in 2019. However, Peritoneal Dialysis International had the highest mean citation times per article, with 298.5 citation times.

3.5. The top 5 institutions contributing to the most cited papers in the top 100 articles

With respect to the institutions listed in Table 5, Baxter International, Inc., the University of California System, and the University of Toronto were the most productive institutions, with 10 articles, followed by the Chinese University of Hong Kong and Pennsylvania Commonwealth System of Higher Education, with 8 articles. Baxter International, Inc. also had the highest total citation times. However, Pennsylvania Commonwealth System of Higher Education had the highest mean citation times per article, with 316.88 citation times.

4. Discussion

In this bibliometric analysis, we identified the 100 top cited articles in the field of PD research over the past decades. These are representative of the many landmarks that have occurred in PD research over the past decades.

The most popular article, which had 733 citations, was basic research, reporting that further research is required to assess factors other than small-solute clearances and to determine their effects on survival.[7] The following reasons might account for the popularity of this study. First, the study was published in 2002. As we know, papers conducted in earlier years were likely to be cited more frequently. Additionally, the methodology of the study was scientific and strict, which guaranteed the reliability of the conclusion. The second-place paper was classic clinical research. The findings created a comprehensive analysis of the morphologic changes that occur in the parietal peritoneal membranes of patients undergoing PD.[8] The third and the fifth articles were guidelines on PD-related infections. The results demonstrate that influential guidelines also achieved the most citations. PD-related infections are one of the most important complications following PD, which has a great impact on the PD patients.[9,10] The critical glomerular filtration rate (GFR) level has not been defined, but is probably that reached after 2 to 3 year of peritoneal dialysis treatment, when the survival advantage of peritoneal dialysis over hemodialysis is lost.[11]

Among the top cited articles, the majority originated from the United States and European developed countries. The United States ranked first with 51 articles, followed by Canada and England. The United States had the highest total citation times, and citation times in 2019. However, Spain had the highest average, at 334.43 citations per article. This shows that PD has been studied more frequently in Spain in recent years. There is no

Table 4

Top 5 journals that contributed most to the top 100 most cited articles.

Journal	Number of articles	Total citations	Average citations per article	Citation (2019)
Journal of the American Society of Nephrology	28	7611	271.82	373
American Journal of Kidney Diseases	17	3634	213.76	205
Kidney International	17	3461	203.59	132
Peritoneal Dialysis International	8	2388	298.5	107
Nephrology Dialysis Transplantation	6	1461	243.5	69

Table 5

Top 5 institutions that contributed most to the top 100 most cited papers in PD.

Institution	Country	Papers	Total citations	Average citations per paper
Baxter International Inc	USA	10	3096	309.6
University of California System	USA	10	2397	239.7
University of Toronto	Canada	10	2527	252.7
Chinese University of Hong Kong	China	8	2526	315.75
Pennsylvania Commonwealth System of Higher Education	USA	8	2535	316.88

doubt that the United States made the greatest contribution to the developments of research on PD. Our study also found China was in 5th the rankings. Because of the high prevalence of PD in China, where 73% of dialysis patients are on PD, extensive research funding has been used to study the development of PD, demonstrating that China has made considerable progress in PD research. The scientific research has achieved rapid progress in recent years, and authors in Asian countries did have a place in the field of PD research. I believe developing countries should try their best to improve the quality of articles in future.

The majority of the top cited articles were published in journals with the high impact factors, including the New England Journal of Medicine, Lancet, Science, and Nature. In our study, 28 percent of the top-cited papers were published in the Journal of the American Society of Nephrology, as the most productive journals, including total citation times, and citation times in 2016, followed by the American Journal of Kidney Diseases, Kidney International and Peritoneal Dialysis International. Peritoneal Dialysis International, which has been a hot spot for PD in recent years, had the highest average of 298.5 citations per article. This result highlights a growing trend in which highly influential articles are published in specialized journals and are not limited to the most well-known general medical journals.

Baxter International, Inc., the University of California System, and the University of Toronto had the largest number of papers, followed by the Chinese University of Hong Kong and Pennsylvania Commonwealth System of Higher Education. Three of the 5 institutions are from the United States, 1 from North America, and 1 from Asia. This finding seems to conform to the phenomenon "the better the economic ranking of a country, the higher the quantity and quality of its biomedical publications". However, authors in China are gaining an increasingly important place in the field of PD because of their increasing gross national product and the expenditure allotted for research and development.

In our study, peritonitis was found to be a hot spot in PD research. Peritonitis is a common and serious complication of PD. Although less than 5% of peritonitis episodes cause death, peritonitis is a direct or major cause of death in approximately 16% of PD patients. In addition, severe or long-term peritonitis can cause changes in the structure and function of the peritoneum, eventually leading to membrane failure. Furthermore, peritonitis is a major cause of PD technology failure and conversion to long-term hemodialysis.[12–17]

There were some possible methodological limitations in this study. Our results were influenced by our choice of search database, and several good-quality PD articles published under other titles and abstracts might not have been included. In addition, there may be many factors that can affect the total amount of citations obtained by an article, and the academic influence of an article cannot be reflected by citations alone. Older articles may be cited more than recent articles because citations logically depend on the year they were published and because citations accumulate over time. Due to short publication times, some of them may have been missed in our analysis of high-quality articles. Moreover, language of publication plays a major role and has a clear bias for articles published in English journals. Despite these obvious flaws, the data presented here provide insight into the achievements and developments of PD research over the past decades.

5. Conclusion

In this study, we analyzed the 100 most cited articles focused on PD via bibliometric approaches. To our knowledge, this is the first bibliometric study to identify the most influential papers in PD research. This report presents major advances and changes in research regarding PD and can serve as a guide for writing a citable article.

Author contributions

Conceptualization: Xinke Yuan, Hui Li.
Data curation: Xinke Yuan, Hui Li, Luting Zhou.
Formal analysis: Xinke Yuan, Hui Li.
Methodology: Xinke Yuan, Luting Zhou.
Project administration: Yinghong Huang.
Supervision: Hui Li, Luting Zhou, Yinghong Huang.
Writing – original draft: Xinke Yuan.
Writing – review & editing: Xinke Yuan, Yinghong Huang.

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