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An Assessment of the 100 Most Frequently Cited Articles Regarding Extracorporeal Membrane Oxygenation in the Literature

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Abstract

BACKGROUND/AIMS: The aim of this study was to evaluate the most common 100 publications related to extra-corporeal membrane oxygenation (ECMO) in the literature.

MATERIALS AND METHODS: Our study was conducted using the advanced mode of the Web of Science (WOS) search engine of the institute for scientific information. "TS=Extracorporeal" or "TI=Extracorporeal" terms were used for the search. The search was made on 09/09/2018 and the 100 most cited publications were identified. The total number of citations of each publication, the number of annual citations, the researchers, and the catalog data of the journals were determined using WOS and PubMed.

RESULTS: From September 1975 to 2018, there were a total of 33,007 publications in the WOS search engine. Among the top 100 most cited studies, the highest number of citations was 1,212, and the lowest was 105. The total number of citations was 213.83±157.53. The annual average number of citations of the studies ranged between 121.20 and 3.29, and the mean number of studies was 17.60±16.20.

CONCLUSION: Our study is the first study to evaluate and analyze the first 100 studies related to ECMO in the literature. We found an increase in the number of publications on ECMO over the last five years.

Keywords: Extracorporeal membrane oxygenation, citation, first 100, index, ECMO

INTRODUCTION

In current era, several studies have been conducted by different international or national institutes and surgical disciplines in order to determine the most cited articles for various medical areas.[1-4] When a scientific paper gives a reference to another scientific paper, it is identified as "cited". The scientific articles which have been a resource of the study or strengthen the findings of the study are accepted as cited if they are referred to in any part of another scientific paper. The impact factor of the article is evaluated according to its frequency of citation. The more cited articles and the journals with a higher impact factor accepted as more qualified.[5,6]

The first bibliographic study was written by Garfield et al.[7] regarding the 100 citation classics from the Journal of the American Medical Association and published in the Journal of the American Medical Association (JAMA). Since then, numerous articles have been examined and presented as "the most cited articles" in specific journals.[7-13]

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Myocardial damage may require the use of intra-aortic balloon pump or extra-corporeal membrane oxygenation (ECMO). ECMO is one of the most important and widely used auxiliary devices that provides support to the lung or heart in reversible conditions of cardiac or respiratory failure. ECMO is the preferred life saving device in cases where heart/lung machines (CPB) cannot be applied. Current articles on ECMO indications, follow-up, complications, positive contributions to transplantation or recovery are frequently encountered in the literature.

According to our research, there has been no recent study in the literature examining the number of citations of international articles related to ECMO. This study will be the first to identify the 100 most cited articles on ECMO. In this study, we aimed to examine the most cited internationally related articles about ECMO via the institute for scientific information (ISI) and the Web of Science (WOS) search engines.

MATERIALS AND METHODS

This study was conducted following Dokuz Eylül University Faculty of Medicine Non-Interventional Research Ethics Committee approval with the number 6264-GOA 2018/25-24 and then performed using the advanced mode of the WOS search engines. Consequently, there was no need for patient consent for the study information. The "SU=ECMO" word was searched for and articles published between September 1975 and 2008 were included. The search was made on 15/10/2018. Consequently, the 130 most cited articles pertaining to BAV which had been published in international journals were identified, and thus a list was created. The first authors in each article were reviewed for whether they took part in another article in the same list. The overall and annual citation count and information about the authors, articles and journals were determined via WOS and PubMed. Thereafter, letters to the editor and case reports were excluded from this study.

Statistical Analysis

Statistical analyzes were carried out using the SPSS (Statistical Package for Social Sciences, Chicago, IL, USA) 20.0 software. Categorical data were presented in absolute (n) and relative (%) frequencies. All hemodynamic data were expressed as the mean value ± standard deviation. In the comparison of the groups, Kruskal-Wallis and Mann-Whitney U tests were utilized. A p-value of <0.05 was considered as statistically significant in all statistical tests.

RESULTS

In the literature analysis from September 1975 to 2018, there were 33,007 publications in the WOS search engine with the search keywords "TS=Extracorporeal" or "TI=Extracorporeal". The highest number of citations in the first 100 most cited studies was 1,212, while the lowest was 105. The mean total number of citations of the 100 most cited studies was 213.83±157.53. The annual mean number of citations of the studies ranged between 121.20 and 3.29 and the mean number of studies was 17.60±16.20.

The most cited study was conducted by Peek et al.[14] Lancet trial, published in 2009, titled "Efficacy and economic assessment of conventional ventilatory support versus extracorporeal membrane oxygenation for severe adult respiratory failure (CESAR): A multicentre randomised controlled trial". The first three topics of the 100 most referenced studies in the area of ECMO were acute respiratory distress syndrome (ARDS) (25%), CPR (17%) and neonatal respiratory distress syndrome (YD-RDS) with peritoneopericardial diaphragmatic hernia (YD PPDH) (13%). The study with the highest number of citations was published in the Annals of Thoracic Surgery (9%), followed by Critical Care Medicine (9%), the Journal of Thoracic and Cardiovascular Surgery (7%), Pediatrics (7%), the Lancet (7%), and JAMA (7%).

All of the 100 most cited articles in the field of ECMO were in the SCI index. When the distribution of the studies by country was examined, the first three countries were determined to be the United States (57%), Germany (7%) and France (7%). It was determined that 28% of the studies were from the European countries and 72% from countries outside the European continent. No significant relationship was found between the continent of the author and the total and annual citations or between the continent of the journal and the number of total and annual citations ($p>0.05$) (Table 1, 2).

When the 100 most cited studies were evaluated, it was found that the mean number of annual citations of the studies published between 2005-2009 and after 2010 was significantly higher than the other periods ($p<0.001$). In the evaluation made according to the authors' country, there was no significant difference in terms of the total number of citations and the mean number of annual citations (Table 3, 4).

When evaluated according to the types of the most cited 100 study, the total number of citations of and prospective clinical studies and case series was higher than other studies ($p<0.001$). In addition, meta-analyses, prospective studies and compilations were found to be higher than the other studies ($p=0.019$) In our study, it was determined that the annual mean number of citations of ECMO applications in adults was higher than the study of pediatric and adult ECMO subjects ($p=0.001$).

There was a significant difference between the mean and total number of citations in the evaluation made by the department. It was found that the total number of citations ($p=0.010$) was higher in those studies which were evaluated as pediatrics, anesthesia and other branches in the other branches. It was determined that the mean number of annual citations of the studies ($p=0.001$) involving intensive care and cardiology branches were higher than those of other branches.

According to the journals, the mean number of citations ($p=0.002$) and the number of annual citations average of the studies ($p=0.011$) published in the Lancet, NEJM and JAMA journals were significantly higher than other journals. It was determined that the total number of citations of ARDS and YD PPHT studies were higher and the number of annual mean citations was higher in ARDS-related studies.

DISCUSSION

The aim of this study was to investigate the most cited articles of ECMO through the WOS search engine of the ISI. The mean number of annual citations of the 100 most cited studies was significantly higher than the other studies and the number of citation articles was higher than prospective clinical studies. In addition, the total number of cited cases, and the average number of annual citations of prospective studies and review studies were higher than other studies. The mean number of annual citations was higher in those studies related to practices. Also, there was a significant difference between the mean and total number of citations in the evaluation made according to the department and results of the studies. It was determined that the mean number of annual citations was higher in those articles related with ARDS and YD PPHT.

Table 1. Distribution of first-name authors of the 100 most cited articles in the field of ECMO

Author name	Frequency	Percent
Kinsella JP.	4	4
Bartlett RH.	4	4
Gattinoni L.	3	3
Combes A.	3	3
Clark RH.	2	1
Delnido PJ.	2	2
Duncan BW.	2	2
Finer NN.	2	2
Kagawa E.	2	2
Peek GJ.	2	2
Schmidt M.	2	2
Thiagarajan RR.	2	2
Hoopes CW.	1	1
Abrams D.	1	1
Aharon AS	1	1
Aigner C.	1	1
Arnold JH.	1	1
Barbaro RP.	1	1
Beck R.	1	1
Bennett CC.	1	1
Bermudez CA.	1	1
Biarent D.	1	1
Bisdas T.	1	1
Brodie D.	1	1
Brogan TV.	1	1
Chen JS.	1	1
Chen Y.	1	1
Cheng R.	1	1
Clement KC.	1	1
Conrad SA.	1	1
Dalton HJ.	1	1
Davidson D.	1	1
Davies A.	1	1
Doll N.	1	1
Field D.	1	1
Fuehner T.	1	1
Glass P.	1	1
Haines NM.	1	1
Harrison MR.	1	1
Hemmila MR.	1	1
Hirschl RB.	1	1
Ko WJ.	1	1
Kolla S.	1	1
Kolovos NS.	1	1
Krafft P.	1	1
Le Guen M.	1	1
Lewandowski K.	1	1
MacLaren G.	1	1
Maekawa K.	1	1
Magliocca JF.	1	1
Marasco SF.	1	1
Mason DP.	1	1
Massetti M.	1	1
Morris AH.	1	1
Morris, MC	1	1
Noah MA.	1	1
Orourke PP.	1	1
Paden ML.	1	1
Pagani FD.	1	1
Patroniti N.	1	1
Peura JL.	1	1
Pham T.	1	1
Rastan AJ.	1	1
Roberts JD.	1	1
Sakamoto T.	1	1
Schumacher RE.	1	1
Sheu J.	1	1
Shin TG	1	1
Smedira NG.	1	1
Stolar CJH.	1	1
Stork E.	1	1
Stub D.	1	1
Suchyta MR.	1	1
Towne BH.	1	1
Turner DA.	1	1
Walpoth BH.	1	1
Walsh-Sukys MC.	1	1
Wang J.	1	1
Werdan K	1	1
Zabrocki LA.	1	1
Zangrillo A.	1	1
Zwischenberger JB.	1	1
Total	100	100

ECMO: extra-corporeal membrane oxygenation.

The use of ECMO is being tried in more and more extensive indications with the spread of the ECMO team. The current guidelines include bridging treatments under ECMO support. Original research articles on ECMO have been increasing in number with experience. In this study, reviewing the most cited internationally cited articles related to ECMO through the ISI and the WOS search engine provided an up-to-date perspective to see the differences between these articles according to their authors, countries and institutions.

The first oxygenator-like device was developed by Von Frey and Gruber in 1885, while Gibbon developed the first film/bubble oxygenation heart-lung machine and Clowes et al. continued to develop membrane

Table 2. The distribution of the institutions of the first-named authors of the 100 articles most cited in the field of ECMO

Hospital name	Frequency	Percent (%)
Michigan University	11	11
Pierre-Marie Curie University	5	5
Pittsburgh University	4	4
Washington University Child Hospital	4	4
Boston Child Hospital	4	4
Gottingen University	3	3
Colorado University	3	3
LDS Hospital	2	2
Hannover Medical School	2	2
Emory University	2	2
Royal Alexandra University	2	2
Leipzig University	2	2
Harvard Medical School	2	2
Glenfield Hospital	2	2
Vienna University	2	2
Duke University	2	2
National Singapore University Hospital	1	1
Case Western Reserve University	1	1
Hiroshima Asa Hospital	1	1
Long Island Jewish Medical Center	1	1
Milano Bicocca University	1	1
National Taiwan University Hospital	1	1
Vanderbilt University Medical Center	1	1
Alfred Hospital	1	1
American Cardiology Council	1	1
Arkansas University	1	1
St. Paul Hospital	1	1
Bern University	1	1
Brussels Child Hospital	1	1
Caen Fransa University Hospital	1	1
California University	1	1
Cedars-Sinai Heart Institute	1	1
Chang Gung Memorial Hospital	1	1
Cleveland Cardiovascular Surgery Institute	1	1
Cleveland Clinic	1	1
Columbia University	1	1
Dijon Child Hospital	1	1
ECMO Trial Group	1	1
Extracorporeal Cardiopulmonary Resuscitation Japanese Scientific Research Group	1	1
Epworth Hospital	1	1
Galveson University	1	1
Heartlink ECMO Center	1	1
Hiroshima City Hospital	1	1
Humboldt University	1	1
Kentucky University	1	1
Leicester University	1	1
Louisiana University	1	1
Martin-Luther University	1	1
Monash University	1	1
New York Columbia University	1	1
Pekin Anzhen Hospital	1	1
Penn State Hershey Child Hospital	1	1
Philadelphia Child Hospital	1	1
REVA University	1	1
San Raffaele Science Institute	1	1
Sapporo University Medical School	1	1
Sungkyunkwan University Medical School	1	1
Taiwan University	1	1
Utah University	1	1
Far East Memorial Hospital	1	1
Wisconsin University Medical School	1	1
Yale University Medical School	1	1
Total	100	100

ECMO: extra-corporeal membrane oxygenation.

oxygenators.[15-17] The first successful neonatal ECMO was performed in 1975. A large number of scientific research articles have been published in order to increase the success rate of ECMO applications and to reduce morbidity. In study based on 827 ECMO cases in newborns, it was observed that leukocyte reduced blood use, and decreased complications related to transfusion in ECMO.[17] In neonatal ECMO cases, complications related to transfusion were found to be reduced by 41% with concentrated platelet replacement.[18] In a study with newborns, it was found that high prime volume was a significant risk factor in postoperative ECMO support in 64 cases with low birth weight (below 2.5 kg).[19]

It is important to evaluate the scientific effectiveness of articles with the number of citations and annual mean citations of scientific articles on ECMO. We aimed to capture a scientific point of view by reviewing and interpreting the first 100 publications on ECMO. As a result of the increase in interventional procedures in the cardiovascular field with technology, the number of bibliographic publications has increased in the current literature.

Kolkailah et al.[20] published a bibliographic study on human heart transplantations with half a century of experience. In that study, it was found that 85% of the researchers were male, and they could not find a significant relationship between the journal's primary index and the number of annual journal editions. Usman et al.[21] examined the first 100 publications on heart valve diseases and found an increase in the number of publications with catheter-based methods in recent years. We found that interventional procedures made with the support of ECMO in recent years have also increased in terms of their publication and citation index over the last 5 years. Researchers can carry out more work on this issue.

Lai et al.[22] performed bibliographic research on aortic dissection and reported results on the development of aortic dissection surgical techniques. Liao et al.[23] pointed out an increase in treatment with

Table 3. Number-article year-authors-citation number-citation average					
1	Efficacy and Economic Assessment of Conventional Ventilatory Support Versus Extracorporeal Membrane Oxygenation for Severe Adult Respiratory Failure (CESAR): A Multicentre Randomised Controlled Trial. Lancet; 374(9698):1351-63.	2009	Peek, Mugford M, Tiruvoipati R, et al.	1212	121.20
2	Extracorporeal Membrane Oxygenation for 2009 Influenza A(H1N1) Acute Respiratory Distress Syndrome. JAMA; 302(17):1888-95.	2009	Davies A, Jones D, Bailey M, et al.	783	78.30
3	Randomized Clinical-Trial of Pressure-Controlled Inverse Ratio Ventilation and Extracorporeal CO2 Removal for Adult-Respiratory-Distress-Syndrome. American Journal of Respiratory and Critical Care Medicine; 149(2):295-305.	1994	Morris A, Wallace C, Menlove R, et al.	579	23.16
4	Low-Dose Inhalational Nitric-Oxide in Persistent Pulmonary-Hypertension of the Newborn. Lancet; 340(8823):819-20.	1992	Kinsella J, Neish J, Shaffer E, et al.	571	21.15
5	Extracorporeal-Circulation in Neonatal Respiratory-Failure - A Prospective Randomized Study. Pediatrics; 76(4):479-87.	1985	Barlett R, Roloff D, Cornell R, et al.	498	14.65
6	Inhaled Nitric Oxide and Persistent Pulmonary Hypertension of the Newborn. New England Journal of Medicine; 336(9):605-610.	1997	Roberts J, Fineman J, Morin F, et al.	483	21.95
7	Low-Frequency Positive-Pressure Ventilation with Extracorporeal CO2 Removal in Severe Acute Respiratory-Failure. JAMA; 256(7):881-86.	1986	Gattinoni L, Pesenti A, Mascheroni D, et al.	472	14.30
8	Cardiopulmonary Resuscitation with Assisted Extracorporeal Life-Support Versus Conventional Cardiopulmonary Resuscitation in Adults with In-Hospital Cardiac Arrest: An Observational Study and Propensity Analysis. Lancet; 372(9638):554-61.	2008	Chen Y, Lin J, Yu, Hsi Y, et al.	465	42.27
9	Inhaled Nitric Oxide in Full-Term and Nearly Full-Term İnfants with Hypoxic Respiratory Failure. New England Journal of Medicine; 336(9):597-604.	1997	Stork E, Gorjanc E, Verter J, et al.	463	21.05
10	Low-Dose Nitric Oxide Therapy for Persistent Pulmonary Hypertension of the Newborn. New England Journal of Medicine; 342(7):469-74.	2000	Clark R, Kueser T, Walker M, et al.	392	20.63
11	UK Collaborative Randomised Trial of Neonatal Extracorporeal Membrane Oxygenation. Lancet; 348(9020):75-82.	1996	Field D, Davis C, Elbourne D, et al.	375	1.30
12	Referral to an Extracorporeal Membrane Oxygenation Center and Mortality Among Patients with Severe 2009 Influenza A(H1N1). JAMA; 306(15):1659-68.	2011	Noah M, Peek G, Finney S, et al.	349	43.63
13	Extracorporeal Membrane Oxygenation for ARDS in Adults. New England Journal of Medicine; 365(20):1905-14.	2011	Brodie D, Bacchetta M, et al.	340	42.50
14	Extracorporeal Membrane-Oxygenation and Conventional Medical Therapy in Neonates with Persistent Pulmonary-Hypertension of the Newborn - A Prospective Randomized Study. Pediatrics; 84(6):957-63.	1989	Orourke P, Crone R, Vacanti J, et al.	340	11.33
15	Extracorporeal Life Support Organization Registry Report 2012. Asaio Journal; 59(3):202-10.	2013	Paden M, Conrad S, Rycus P, et al.	318	53.00
16	Extracorporeal Membrane-Oxygenation (Ecmo) in Neonatal Respiratory-Failure - 100 Cases. Annals of Surgery; 204(3):236-45.	1986	Barlett R, Gazzaniga A, Toomasian J, et al.	276	8.36
17	Randomized, Multicenter Trial of Inhaled Nitric Oxide and High-Frequency Oscillatory Ventilation in Severe, Persistent Pulmonary Hypertension of The Newborn. Journal of Pediatrics; 131(1):55-62.	1997	Kinsella J, Truog W, Walsh W, et al.	272	12.36
18	Outcomes and Long-Term Quality-of-Life of Patients Supported by Extyacorpoyeal Membrane Oxygenation for Refractory Caydiogenic Shock. Crit Care Med; 36(5):1404-11.	2008	Combes A, Leprince P, Luyt C, et al.	264	24.00
19	Persistent Pulmonary Hypertension of the Newborn in the Era Before Nitric Oxide: Practice Variation and Outcomes. Pediatrics; 105(1):14-20.	2000	Walsh-Sukys M, Tyson J, Wright L, et al.	260	13,68
20	A Prospective-Study of the Outcome for Fetuses with Diaphragmatic-Hernia. JAMA; 271(5):382-384.	1994	Harrison M, Adzick N, Estes J, et al.	255	10.20
21	Extracorporeal Life Support for Severe Acute Respiratory Distress Syndrome in Adults. Ann Surg; 240(4):595-605.	2004	Hemmila M, Rowe S, Boules T, et al.	254	16.93
22	Clinical-Responses to Prolonged Treatment of Persistent Pulmonary-Hypertension of the Newborn with Low-Doses of Inhaled Nitric-Oxide. Journal of Pediatrics. 123(1):103-108.	1993	Kinsella J, Neish S, İvy D, et al.	253	9.75
23	Extracorporeal Membrane Oxygenation in Adults with Severe Respiratory Failure: A Multi-Center Database. Intensive Care Med; 35(12):2105-14.	2009	Brogan T, Thiagarajan R, Rycus, P, et al.	241	24.10
24	Extracorporeal Membrane-Oxygenation for Newborn Respiratory-Failure - 45 Cases. Surgery; 92(2):425-33.	1982	Barlett R, Andrews R, Toomasian J, et al.	239	6.46
25	Outcome of Survivors of Accidental Deep Hypothermia and Circulatory Arrest Treated with Extracorporeal Blood Warming. N Engl J Med; 337(21):1500-5.	1997	Walpoth B, WalpothAslan B, Mattle H, et al.	232	10.55
26	Lung Structure and Function in Different Stages of Severe Adult-Respiratory-Distress-Syndrome. JAMA; 271(22):1772-79.	1994	Gattioni L, Bombino M, Pelosi P, et al.	229	9.16

Table 3. Continued

27	Extracorporeal Membrane Oxygenation in Awake Patients as Bridge to Lung Transplantation. Am J Respir Crit Care Med; 185(7):763-8.	2012	Fuehner T, Kuehn, C, Hadem J, et al.	221	36.83
28	Extracorporeal Life Support - The University of Michigan Experience. JAMA; 283(7):904-8.	2000	Bartlett R, Roloff D, Custer J, et al.	216	11.37
29	Extracorporeal Membrane Oxygenation for Pandemic İnfluenza A(H1N1)-Induced Acute Respiratory Distress Syndrome A Cohort Study and Propensity-Matched Analysis. American Journal of Respiratory and Critical Care Medicine; 187(3):276-85.	2013	Pham T, Combes A, et al.	208	34.67
30	Initial Experience with Partial Liquid Ventilation in Adult Patients with the Acute Respiratory Distress Syndrome. JAMA; 275(5):383-9.	1996	Hirschl R, Pranikoff, T, Wise C, et al.	200	8.70
31	Early and Late Outcomes of 517 Consecutive Adult Patients Treated with Extracorporeal Membrane Oxygenation for Refractory Postcardiotomy Cardiogenic Shock. J Thorac Cardiovasc Surg; 139(2):302-11.	2010	Rastan A, Dege, A, Mohr M, et al.	195	21.67
32	Extracorporeal Life Support Registry Report 2004. ASAİO J; 51(1):4-10.	2005	Conrad S, Rycus P, Dalton H, et al.	195	13.93
33	Inhaled Nitric Oxide for The Early Treatment of Persistent Pulmonary Hypertension of the Term Newborn: A Randomized, Double-Masked, Placebo-Controlled, Dose-Response, Multicenter Study. Pediatrics; 101(3):325-34.	1998	Davidson D, Barefield E, Kattwinkel J, et al.	195	9.29
34	Treatment of Acute Respiratory-Failure with Low-Frequency Positive-Pressure Ventilation and Extracorporeal Removal of Co2. Lancet; 2(8189):292-4.	1980	Gattinoni L, Pesenti A, Rossi G, et al.	190	4.87
35	Inhaled Nitric Oxide and Hypoxic Respiratory Failure in İnfants with Congenital Diaphragmatic Hernia. Pediatrics; 99(6):838-45.	1997	Finer N, Solimano A, Germain F, et al.	190	4.87
36	Inhaled Nitric-Oxide in Infants Referred for Extracorporeal Membrane-Oxygenation - Dose-Response. Journal of Pediatrics; 124(2):302-8.	1994	Finer N, Etches P, Kamstra B, et al.	189	7.56
37	Contemporary Extracorporeal Membrane Oxygenation for Adult Respiratory Failure: Life Support in the New Era. Intensive Care Medicine; 38(2):210-20.	2012	MacLaren G, Combes A, Bartlett, R, et al.	188	26.86
38	The PRESERVE Mortality Risk Score and Analysis of Long-Term Outcomes after Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Distress Syndrome. Intensive Care Medicine; 39(10):1704-13.	2013	Schmidt M, Zogheib E, Roze H, et al.	186	31.00
39	Refractory Cardiac Arrest Treated with Mechanical CPR, Hypothermia, ECMO and Early Reperfusion (The CHEER Trial). Resusciation; 86:88-94.	2015	Stub D, Bernard S, Pellegrino V, et al.	186	46.50
40	European Resuscitation Council Guidelines for Resuscitation 2010 Section 6 Paediatric Life Support. Resuscitation; 81(10):1364-88.	2010	Biarent D, Bingham R, Eich C, et al.	185	20.56
41	Complications of Extracorporeal Membrane Oxygenation for Treatment of Cardiogenic Shock and Cardiac Arrest: A Meta-Analysis of 1,866 Adult Patients. Annal of Thpracic Surgery; 97(2):610-6.	2014	Cheng R, Hachamovitch R, Kittleson M, et al.	185	37.00
42	Extracorporeal Membrane Oxygenation to Aid Cardiopulmonary Resuscitation in Infants and Children. Circulation; 116(15):1693-700.	2007	Thiagarajan R, Laussen, P, Rycus T, et al.	184	15.33
43	Extracorporeal Life Support for 100 Adult Patients with Severe Respiratory Failure. Annals of Surgery; 226(4):544-64.	1997	Kolla S, Awad S, Rich P, et al.	180	8.18
44	The Acute Respiratory Distress Syndrome: Definitions, Severity and Clinical Outcome - An Analysis of 101 Clinical Investigations. Intensive Care Medicine; 22(6):519-29.	1996	Krafft P, Fridrich P, Pernerstorfer T, et al.	180	7.83
45	High Survival Rate in 122 ARDS Patients Managed According to A Clinical Algorithm Including Extracorporeal Membrane Oxygenation. Intensive Care Medicine; 23(8):819-35.	1997	Lewandowski K, Rossaint R, Pappert D, et al.	177	8.05
46	Clinical-Experience with 202 Adults Receiving Extracorporeal Membrane Oxygenation for Cardiac Failure: Survival at Five Years. Journal of Thoracic and Cardiovascular Surgery; 122(1):92-102.	2001	Smedira NG, Moazami N, Golding CM, et al.	175	9.72
47	Single-Institution Experience with Interhospital Extracorporeal Membrane Oxygenation Transport: A Descriptive Study. Pediatric Critical Care Medicine; 11(4):509-13.	2010	Clement KC, Fiser RT, Fiser WP, et al.	171	19.00
48	Extracorporeal Cardiopulmonary Resuscitation in Patients with In-hospital Cardiac Arrest: A Comparison with Conventional Cardiopulmonary Resuscitation. Crit Care Med; 39(1):1-7.	2011	Shin TG, Choi JH, Joo IK, et al.	171	21.88
49	Back from Irreversibility: Extracorporeal Life Support for Prolonged Cardiac Arrest. Annals of Thoracic Surgery; 79(1):178-84.	2005	Massetti, M, Tasle M, Le Page O, et al.	169	12.07
50	The Italian ECMO Network Experience During the 2009 Influenza A(H1N1) Pandemic: Preparation for Severe Respiratory Emergency Outbreaks. Intensive Care Medicine; 37(99):1447-57.	2011	Patroniti N, Zangrillo A, Pappalardo, F, et al.	166	20.75

Table 3. Continued					
51	Extracorporeal Membrane-Oxygenation and Neonatal Respiratory-Failure - Experience from the Extracorporeal Life-Support Organization. Journal of Pediatric Surgery; 26(5):563-71.	1991	Stolar C, Snedecor S, Barlett R, et al.	164	5.86
52	Review of ECMO (Extra Corporeal Membrane Oxygenation) Support in Critically ill Adult Patients. Heart Lung and Circulation; 17:S41-7.	2008	Marasco SF, Lukas G, McDonald M, et al.	163	14.82
53	Inhaled Nitric Oxide in Premature Neonates with Severe Hypoxaemic Respiratory Failure: A Randomised Controlled Trial. Lancet; 354(9184):1061-5.	1999	Kinsella J, Walsh W, Bose C, et al.	163	8.15
54	Five-Year Results of 219 Consecutive Patients Treated with Extracorporeal Membrane Oxygenation for Refractory Postoperative Cardiogenic Shock. Annals of Thoracic Surgery; 77(1):151-7.	2004	Doll N, Kiaii B, Borger, M, et al.	162	10.80
55	Early Extracorporeal Membrane Oxygenator-Assisted Primary Percutaneous Coronary Intervention Improved 30-Day Clinical Outcomes in Patients with ST-Segment Elevation Myocardial Infarction Complicated with Profound Cardiogenic Shock. Critical Care Medicine; 38(9):1810-17.	2010	Sheu J, Tsai T, Lee F, et al.	161	17.89
56	Position Paper for The Organization of Extracorporeal Membrane Oxygenation Programs for Acute Respiratory Failure in Adult Patients. American Journal of Respiratory and Critical Care Medicine; 190(5):488-96.	2014	Combes A, Brodie D, Bartlett, R, et al.	159	31.80
57	Predicting Survival After Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Failure: The Respiratory Extracorporeal Membrane Oxygenation Survival Prediction (RESP) Score. American Journal of Respiratory and Critical Care Medicine; 189(11): 1374-82.	2014	Schmidt M, Bailey M, Sheldrake J, et al.	156	31.20
58	Extracorporeal Membrane Oxygenation to Support Cardiopulmonary Resuscitation in Adults. Annals of Thoracic Surgery; 87(3):778-85.	2009	Thiagarajan R, Brogan T, Scheurer M, et al.	153	15,30
59	Extracorporeal Membrane Oxygenation Support for Adult Postcardiotomy Cardiogenic Shock. Annals of Thoracic Surgery; 73(2):538-45.	2002	Ko W, Lin C, Chen R, et al.	146	8.59
60	Mechanical Circulatory Support for The Treatment of Children with Acute Fulminant Myocarditis. Journal of Thoracic and Cardiovascular; 122(3):440-8.	2001	Duncan B, Bohn D, Atz A, et al.	146	8.11
61	Extracorporeal Cardiopulmonary Resuscitation Versus Conventional Cardiopulmonary Resuscitation in Adults with Out-of-Hospital Cardiac Arrest: A Prospective Observational Study. Resuscitation; 85(6):762-8.	2014	Sakamoto T, Morimura N, Nagao K, et al.	146	29.20
62	A Meta-Analysis of Complications and Mortality of Extracorporeal Membrane Oxygenation. Critical Care and Resuscitation; 15(3):172-8.	2013	Zangrillo A, Landoni G, Biondi-Zoccai G, et al.	145	24.17
63	Prospective, Randomized Comparison of High-Frequency Oscillation and Conventional Ventilation in Candidates for Extracorporeal Membrane-Oxygenation. Journal of Pediatrics; 124(3):447-54.	1994	Clark R, Yoder B, Sell M, et al.	144	5.76
64	Mechanical Circulatory Support in Cardiogenic Shock. European Heart Journal; 35(3):156.	2014	Werdan K, Gielen, S, Ebelt H, et al.	143	28.60
65	Use of Rapid-Deployment Extracorporeal Membrane Oxygenation for the Resuscitation of Pediatric Patients with Heart Disease After Cardiac Arrest. Journal of Thoracic and Cardiovascular Surgery; 116(2):305-11.	1998	Duncan B, İbrahim A, Hraska V, et al.	142	6.76
66	Tolerance and Dependence in Neonates Sedated with Fentanyl During Extracorporeal Membrane-Oxygenation. Anesthesiology; 73(6):1136-40.	1990	Arnold J, Truog R, Orav E, et al.	136	4.69
67	Extracorporeal Support for Organ Donation after Cardiac Death Effectively Expands the Donor Pool. Journal of Trauma-Injury Infection and Critical Care; 58(6):1095-101.	2005	Magliocca J, Magee J, Rowe S, et al.	133	9.50
68	Extracorporeal Life Support Following Out-of-Hospital Refractory Cardiac Arrest. Critical Care; 15(1):R29.	2011	Le Guen M, Nicolas-Robin A, Carreira S, et al.	133	16.63
69	Vascular Complications in Patients Undergoing Femoral Cannulation for Extracorporeal Membrane Oxygenation Support. Annals of Thoracic Surgery; 92(2):626-31.	2011	Bisdas T, Beutel G, Warnecke G, et al.	131	16.38
70	Extracorporeal Membrane Oxygenation in Children after Repair of Congenital Cardiac Lesions. Annals of Thoracic Surgery; 72(6):2095-101.	2001	Aharon A, Drinkwater D, Churchwell K, et al.	131	7.28
71	Extracorporeal Membrane Oxygenation for Adult Respiratory Failure. Chest; 112(3):759-64.	1997	Peek GJ, Moore HM, Moore N, et al.	130	5.20
72	Recommendations for the Use of Mechanical Circulatory Support: Device Strategies and Patient Selection, a Scientific Statement from the American Heart Association. Circulation; 126(22):2648-67.	2012	Peura J, Colvin-Adams M, Francis G, et al.	127	18.14
73	Outcome of Pediatric Patients Treated with Extracorporeal Life Support after Cardiac Surgery Annals of Thorasic Surgery; 76(5):1435-41.	2003	Kolovos N, Bratton S, Moler F, et al.	127	7.94

Table 3. Continued

74	Extracorporeal Membrane Oxygenation for Pediatric Respiratory Failure: Survival and Predictors of Mortality. Critical Care; 39(2):364-70.	2011	Zabrocki L, Brogan T, Statler K, et al.	124	15.50
75	Risk Factors for Mortality in 137 Pediatric Cardiac Intensive Care Unit Patients Managed with Extracorporeal Membrane Oxygenation. Critical Care Medicine; 32(4):1061-9.	2004	Morris MC, İttenbach, RF, Godinez Rİ, et al.	124	8.27
76	Extracorporeal Life Support to Left Ventricular Assist Device Bridge to Heart Transplant - A Strategy to Optimize Survival and Resource Utilization. Circulation; 100(19):206-10.	1999	Pagani F, Lynch W, Swaniker F, et al.	123,00	6.15
77	Extracorporeal Cardiopulmonary Resuscitation for Patients with Out-of-Hospital Cardiac Arrest of Cardiac Origin: A Propensity-Matched Study and Predictor Analysis. Critical Care Medicine; 41(5):1186-96.	2013	Maekawa K, Tanno K, Hase M, et al.	123	20.50
78	Extracorporeal Membrane Oxygenation in Cardiopulmonary Disease in Adults. Journal of American College of Cardiology; 63(25):2769-78.	2014	Abrams D, Combes A, Brodie D, et al.	122	24.40
79	Association of Hospital-Level Volume of Extracorporeal Membrane Oxygenation Cases and Mortality Analysis of the Extracorporeal Life Support Organization Registry. American Journal of Respiratory and Critical Care Medicine; 191(8):894-901.	2015	Barbaro R, Odetola F, Kidwell K, et al.	121	30.25
80	Morbidity for Survivors of Extracorporeal Membrane-Oxygenation - Neurodevelopmental Outcome at 1 Year of Age. Pediatrics; 83(1):72-8.	1989	Glass P, Miller M, Short B, et al.	121	4.03
81	Should We Emergently Revascularize Occluded Coronaries for Cardiac Arrest? Rapid-Response Extracorporeal Membrane Oxygenation and Intra-Arrest Percutaneous Coronary Intervention. Circulation; 126(13):1605.	2012	Kagawa E, Dote K, Kato M, et al.	121	17.29
82	UK Collaborative Randomised Trial of Neonatal Extracorporeal Membrane Oxygenation: Follow-Up to Age 4 Years. Lancet; 357(9262):1094-6.	2001	Bennett C, Johnson A, Field D, et al.	121	6.72
83	Criteria for Extracorporeal Membrane-Oxygenation in a Population of Infants with Persistent Pulmonary-Hypertension of the Newborn. Journal of Pediatric Surgery; 21(4):297-302.	1986	Becal.k P, Anderson K, Pearson G, et al.	119	3.64
84	Institutional Experience with Extracorporeal Membrane Oxygenation in Lung Transplantation. European Journal of Cardio-Thoracic Surgery; 31(3):468-73.	2007	Aigner C, Wisser W, Taghavi S, et al.	118	9.83
85	Right-Sided Brain-Lesions in Infants Following Extracorporeal Membrane-Oxygenation. Pediatyrics; 82(2):155-61.	1988	Schumacher R, Barks J, Johnsgton M, et al.	117	3.77
86	Extracorporeal Membrane Oxygenation for Respiratory Failure in Adults. Current Opinion in Critical Care; 8(1):99-104.	2012	Combes A, Bacchetta M, Brodie D, et al.	116	16.57
87	Extracorporeal Life Support Registry Report 2008: Neonatal and Pediatric Cardiac Cases. Asaio Journal; 55(1);111-6.	2009	Haines N, Rycus P, Zwischenberger J, et al.	116	11.60
88	Extracorporeal Membrane-Oxygenator Rescue in Children During Cardiac-Arrest after Cardiac-Surgery. Circulation; 86(5):300-4.	1992	Delnido P, Dalton H, Thompson A, et al.	115	4.26
89	Increased Survival of ARDS Patients with Severe Hypoxemia (ECMO Criteria). Chest; 99(4):951-5.	1991	Succhyta M, Clemmer T, Orme J, et al.	115	4.11
90	Should Lung Transplantation be Performed for Patients on Mechanical Respiratory Support? The US Experience. Journal of Thoracic and Cardiovascular Surgery; 139(3):765-73.	2010	Mason D, Thuita L, Nowicki E, et al.	114	12.67
91	Extracorporeal Membrane-Oxygenation Support as a Bridge to Pediatric Heart-Transplantation. Circulation; 90(5):66-9.	1994	Delnido P, Armitage J, Fricker F, et al.	113	4.52
92	Outcome of Veno-Arterial Extracorporeal Membrane Oxygenation for Patients Undergoing Valvular Surgery. PLoS One; 8(5):639-24.	2013	Wang J, Han J, Jia Y, et al.	113	18.83
93	Long-Term Follow-Up of Infants and Children Treated with Extracorporeal Membrane-Oxygenation (ECMO) - A Preliminary-Report. Journal of Pediatric Surgery; 20(4):4114.	1985	Towne B, Lott İ, Hicks D, et al.	112	3.29
94	Active Rehabilitation and Physical Therapy During Extracorporeal Membrane Oxygenation while Awaiting Lung Transplantation: A Practical Approach. Critical Care Medicine; 39(12):2593-8.	2011	Turner D, Cheifetz İ, Rehder K, et al.	111	13.88
95	Extracorporeal Membrane-Oxygenation for Cardiac Rescue in Children with Severe Myocardial Dysfunction. Critical Care Medicine; 21(7):1020-8.	1993	Dalton H, Siewers R, Fuhrman B, et al.	111	4,27
96	Initial Experience with Single Cannulation for Venovenous Extracorporeal Oxygenation in Adults. Annals of Thoracic Surgery; 90(3):991-5.	2010	Bermudez C, Rocha R, Sappington P, et al.	110	12.22
97	Complications of Neonatal Extracorporeal Membrane-Oxygenation - Collective Experience from the Extracorporeal Life-Support Organization. Journal of Thoracic and Cardiovascular Surgery; 107(3):838-49.	1993	Zwischhenberger J, Nguyen T, Upp J, et al.	107	4.28

Table 3. Continued					
98	Extracorporeal Membrane Oxygenation as a Bridge to Pulmonary Transplantation. Journal of Thoracic and Cardiovascular Surgery; 145(3):862-8.	2013	Hoopes C, Kukreja J, Golden J, et al.	107	17.83
99	Analysis of the Outcome for Patients Experiencing Myocardial Infarction and Cardiopulmonary Resuscitation Refractory to Conventional Therapies Necessitating Extracorporeal Life Support Rescue. Critical Care Medicine; 34(4):950-7.	2006	Chen J, Ko W, Yu H, et al.	106	8.15
100	Assessment of Outcomes and Differences Between In- And Out-of-Hospital Cardiac Arrest Patients Treated with Cardiopulmonary Resuscitation Using Extracorporeal Life Support. Resuscitation; 81(8):968-73.	2010	Kagawa E, Inoue I, Kawagoe T, et al.	105	11.67

preventive measures by looking at the first 100 citationed research studies on coronary heart disease. In recent years, Shuaib et al.[24] reported a decrease in the number of publications in the field of cardiology, because there has been a shift to the cardiovascular field and the guidelines support this. In our publication, we made a similar comment by looking at the publication citation number increase in recent years in interventional procedures, and we linked this to the team's work together with the heart team and pointed out an increase in hybrid operations.

Pennell et al.[25] found an increase in the number of studies performed in the last 5 years when they examined cardiovascular magnetic resonance. They attributed this to an increase in the number of patients in the cardiovascular field and the widespread use of imaging methods. Oh and Galis[26] reported bibliographic studies on hypertension and emphasized that there has been an increase in the number of citations in parallel with developments in technology. Friedmacher et al.[27] found that the scientometric analysis of congenital diaphragmatic hernias has increased in recent years with technological developments. ECMO shows the positive effect of congenital diaphragmatic hernia treatment on bridging support on surveillance. In order to develop renewable multidisciplinary therapies, citation index evaluation studies have been emphasized as they have global value.

For the expansion of ECMO cost effectiveness and cardiopulmonary resuscitation with ECMO support, Kilchemmann et al.[28] suggested that bibliometric evaluation should be performed at repeated times in ECMO. Eldredge et al.[29] and Bautista-Rodriguez et al.[30] stated in their studies that further research is needed especially for the success of pediatric ECMO applications. Senst and Diaz[31] reported that the use of ECMO has become widespread after looking at recent publications.

Bacon et al.[32] reviewed current publications on ECMO and presented a review of the positive results of ECMO support in stage II bidirectional Glenn and stage III Fontan procedures in single ventricular patients. Iantorno et al.[33] performed a review of the current literature on the emergency valve-in-valve transcatheter aortic valve replacement of acute aortic regurgitation and cardiogenic shock in the use of preoperative veno-arterial ECMO. They emphasized that case series have been introduced in recent years.

Patroniti et al.[34] reported that the best strategy for mechanical ventilation and respiratory monitoring in ECMO patient monitoring has not been defined by the current literature review. They also presented a compilation of ARDS-ECMO and the conclusion that more publications on ECMO are needed. Cohen et al.[35] evaluated the invasive procedures of emergency treatment in 6 countries up to 2006. They pointed out the importance of digital recordings and the storage of data. They also stated that publications should be evaluated bibliographically with PubMed and other search engines at certain intervals. Loomba and Anderson[36] compiled bibliometric studies and demonstrated the weakness or strength of publications in pediatric cardiology.

The most cited study was conducted by Peek et al.[14] (CESAR-2009): A multi-center randomized controlled trial, published in the journal Lancet. They recommended the transfer of adult patients with severe but potentially reversible respiratory failure with a Murray score of 3.0 or less than pH 7.20 in the optimal conventional treatment to a center with ECMO to significantly improve survival without serious problems. Interestingly, in their study, they found a life quality increase of 0.03 in 6 months follow-up in patients with ECMO.[14]

The ECMO team and E-CPR should be continuously trained. Sepsis and renal failure still negatively affect outcomes. Adjusting the fluid volume balance with high flow; cytokine levels and reducing inflammation response can help weaning. The current issues relating to ECMO should be continuously monitored and interpreted. Questions to be taken into consideration in the decision of ECMO application indication include these; "Is the problem life-threatening?" and "Can the disease be reversed?" The most important parameters for improving ECMO results are timing, management of the system, experience and experience of the team. ECMO support can be life-saving in the treatment of temporary cardiopulmonary insufficiency. In the minds of clinicians dealing with critically ill patients, an alternative to ECMO should be included.

Study Limitations

Similar to all bibliometric studies, this study has many limitations. First, ISI and PubMed, WOS were used to search for the most cited articles. It is known that the number of citations varies between databases. The studies were evaluated on the basis of the number of citations and the mean number of annual citations, but were not ranked accordingly. Additionally, although the number of citations and the mean annual citation rate are traditional parameters in the scientific evaluation of an article, its contribution to science cannot be assessed only by these measures.

CONCLUSION

Bibliographic studies are important as they allow for the following of the citation variances of elite publications according to years, study types, study areas and journals in determining the topics of most interest and citation. In the analysis of the elite articles related to ECMO, it was determined that those studies published after 2005, those studies relating to prospective studies, those studies relating to adult ECMO applications, and the references of those studies related to ARDS and Yd PPHT were at a higher rate.

Table 4. Distribution of the 100 most cited articles in the field of ECMO

	Subgroup	n	Total number of citations (mean ± SD)	Number of citations per year (mean ± SD)	Total citations p-value	Year citations p-value
Year	1990≥	11	235.90±145.24	7.17±4.34	0.432	**<0.001**
	1990-1994	13	228.46±162.46	8.80±6.32		
	1995-1999	16	226.81±114.71	10.22±5.19		
	2000-2004	13	209.84±108.52	13.34±9.57		
	2005-2009	21	241.28±263.54	26.86±26.25		
	>2010	26	169.00±69.93	25.61±11.40		
Author's continents	European	28	228.96±210.31	21.68±22.19	0.456	0.144
	Non-European	72	207.94±132.89	16.02±13.02		
Author's country	USA	57	206.43±119.70	13.30±9.80	0.935	0.091
	France	7	176.42±49.41	23.82±8.90		
	Germany	7	213.71±117.75	17.11±11.55		
	England	6	388.66±418.94	36.20±43.93		
	Taiwan	3	239.0±196.74	19.67±19.57		
	Italy	3	172.66±53.31	16.80±6.62		
	Japan	3	124.00±20.66	19.38±8.95		
	Belgium	3	165.00±43.58	15.44±9.83		
	Australia	3	367.33±359.99	41.44±32.95		
	China	2	137.00±33.94	21.88±0.66		
	Switzerland	2	175±80.61	10.19±0.50		
	Austria	1	180	7.83		
	Canada	1	186.00	46.50		
	Singapore	1	188	26.86		
	Korea	1	171.00	21.88		
Type of publication	Retrospective	47	161.63±102.08	13.97±13.04	**<0.001**	**0.019**
	Prospective clinical	16	284.00±267.55	22.99±28.25		
	Retrospective clinical	14	213.83±157.53	19.92±10.95		
	Review	12	166.58±56.28	22.87±11.57		
	Case series	7	247.42±54.01	13.28±12.94		
	Meta-analysis	3	170.00±21.79	23.00±14.62		
	Guideline	1	185.00	20.56		
Type	Adult	54	219.01±185.43	22.28±19.32	0.637	**<0.001**
	Pediatric	39	217.38±125.45	11.04±8.97		
	Adult ± pediatric	7	154.00±39.48	18.08±6.77		
Branches	Non-surgery	68	222.88±135.08	18.56±13.76	0.405	0.393
	Surgery	32	194.59±198.13	15.57±20.55		
Department	Cardiovascular	45	182.33±216.75	16.01±22.40	0.010	0.001
	Pediatric	24	240.54±122.85	12.36±10.41		
	Intensive care	12	207.33±185.22	25.47±18.61		
	Anesthesia	8	244.00±153.53	11.36±7.32		
	General surgery	7	238.42±136.75	12.19±17.60		
	Cardiology	5	165.80±28.63	26.28±14.53		
	Pediatric intensive care	4	135.25±33.62	14.16±5.72		
	Other	15	238.20±136.75	17.60±16.20		
Diseases	ARDS	25	288.84±246.44	25.53±25.94	**<0.001**	**0.016**
	CPR	17	178.35±85.98	18.73±11.75		
	YD RDS	13	215.61±115.65	10.54±6.06		
	Yd PPHT	13	287.61±148.43	12.08±6.91		
	Total	11	153.81±58.34	23.27±13.83		
	Post-op	8	137.12±20.90	11.48±5.25		
	Tx-lung	5	134.20±48.68	18.20±10.79		
	Tx-heart	3	123.00±10.00	6.72±2.53		
	Other	5	151.80±59.31	10.13±4.68		

Table 4. Continued

	Subgroup	n	Total number of citations (mean ± SD)	Number of citations per year (mean ± SD)	Total citations p-value	Year citations p-value
Journals	Annals of Thoracic Surgery	9	146.00±23.61	14.17±9.11	0.002	0.011
	Critical Care Medicine	9	143.88±50.34	6.85±11.57		
	Journal of Thoracic and Cardiovascular Surgery	7	140.85±34.49	11.57±6.24		
	Pediatrics	7	245.85±135.73	8.80±4.62		
	The Lancet	7	442.42±378.36	41.57±26.09		
	JAMA	7	357.71±210.58	25.09±26.53		
	Intensive Care Medicine	6	189.75±26.32	19.76±9.75		
	American Journal of Respiratory and Critical Care Medicine	6	240.66±169.75	31.31±4.68		
	Circulation	6	130.50±26.71	10.94±6.63		
	New England Journal of Medicine	5	382.00±101.39	23.33±11.67		
	Resuscitation	4	155.50±38.47	26.98±14.85		
	Journal of Pediatrics	4	214.50±58.90	8.85±2.84		
	Journal of Pediatric Surgery	3	131.66±28.21	4.26±1.39		
	Annals of Surgery	3	236.66±50.29	11.15±5.00		
	Asaio Journal	3	209.66±101.79	26.17±23.25		
	Chest	2	122.50±10.60	4.65±0.77		
	Critical Care	1	133.00	16.63		
	Anesthesiology	1	136.00	4.69		
	Critical Care and Resuscitation	1	145.00	24.17		
	Current Opinion in Critical Care	1	116.00	16.57		
	European Heart Journal	1	143.00	28.60		
	European Journal of Cardio-Thoracic Surgery	1	118.00	9.83		
	Heart Lung and Circulation	1	163.00	14.82		
	Journal of the American College of Cardiology	1	122.00	24.40		
	Journal of Trauma-Injury Infection and Critical Care	1	133.00	9.50		
	Pediatric Critical Care Medicine	1	171.00	19.00		
	PLoS One	1	113.00	18.83		
	Surgery	1	239	6.46		
Country	USA	84	201.92±118.94	15.92±12.40	**0.384**	**0.280**
	England	9	374.77±354.11	29.54±36.33		
	Scotland	4	155.50±38.47	26.98±14.85		
	Germany	1	118.00	9.83		
	Australia	2	154.00±12.72	19.49±6.61		
Continent	Non-European	86	200.81±117.76	16.01±12.29	0.544	0.110
	European	14	293.78±300.51	27.40±29.84		

ECMO: extra-corporeal membrane oxygenation, SD: standard deviation, ARDS: acute respiratory distress syndrome, USA: United States of America.

MAIN POINTS

- Our study is the first study to evaluate and analyze the first 100 studies related to ECMO in the literature.
- In the literature analysis from September 1975 to 2018, among the top 100 most cited studies, the highest number of citations was 1,212, and the lowest was 105.
- When the 100 most cited studies were evaluated, it was found that the mean number of annual citations of the studies published between 2005-2009 and after 2010 was significantly higher than other periods ($p<0.001$).
- The first three topics of the 100 most referenced studies in the area of ECMO were ARDS (25%), CPR (17%) and neonatal respiratory distress syndrome with peritoneopericardial diaphragmatic hernia (13%).
- All of the 100 most cited articles in the field of ECMO were in the SCI index. When the distribution of the studies by country was examined, the first three countries were determined to be the United States (57%), Germany (7%) and France (7%).

ETHICS

Ethics Committee Approval: This study was conducted following Dokuz Eylül University Faculty of Medicine Non-Interventional Research Ethics Committee approval with the number 6264-GOA 2018/25-24 and then performed using the advanced mode of the WOS search engines.

Informed Consent: There was no need for patient consent for the study information.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: S.B., T.G., S.B., Ç.B., G.A., V.H., Design: S.B., T.G., S.B., Ç.B., G.A., V.H., Supervision: S.B., T.G., S.B., Ç.B., G.A., V.H., Data Collection and/or Processing: S.B., T.G., S.B., Ç.B., G.A., V.H., Analysis and/or Interpretation: S.B., T.G., S.B., Ç.B., G.A., V.H., Literature Search: S.B., T.G., S.B., Ç.B., G.A., V.H., Writing: S.B., T.G., S.B., Ç.B., G.A., V.H., Critical Review: S.B., T.G., S.B., Ç.B., G.A., V.H.

DISCLOSURES

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