Original Article

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An Altmetric Analysis of Top 100 Cited Articles on Perinatal Infection

Perinatal Enfeksiyon Konusunda En Çok Alıntı Yapılan 100 Makalenin Altmetrik Analizi

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ABSTRACT

Objective: Pregnant women and their fetuses are at increased risk of complications of viral, bacterial, and parasitic infections. For most infections, effective preventive strategies are available. Scientific studies on perinatal infections show advances in this field. The primary objective of this study was to evaluate the social attention paid to highly cited articles on perinatal infection in the last decade. Factors of altmetrics performance, including twitter mentions and the correlation between altmetrics and traditional citation counts were analyzed.

Methods: We created the 100 top-cited articles (T100) list from the Web of Science database and altmetric.com website among 4,240 perinatal infection articles.

Results: The most cited article "Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia" by Zhu H. published in the Translational Pediatrics Journal. The T100 list included 75 original scientific research publications and 25 review articles. On Twitter, 80 of the T100 articles were shared. Of the ten most tweeted articles, five were about 2019-nCoV, four were about Hepatitis B virus, and one was about Zikavirus. The number of AAS, average citations, and the number of tweets (NT) increased statistically significantly as the years increased. A statistically significant and strong correlation was found between AAS and the number of tweets.

Conclusion: This study reflects the most influential publications to identify the trends of current studies and provides some directions

ÖZ

Amaç: Hamile kadınlar ve fetüsleri viral, bakteriyel ve paraziter enfeksiyonların komplikasyonları açısından yüksek risk altındadır. Çoğu enfeksiyon için etkin önleyici stratejiler mevcuttur. Perinatal enfeksiyonlarla ilgili bilimsel çalışmalar bu alandaki gelişmeleri göstermektedir. Bu çalışmanın esas amacı, son on yılda perinatal enfeksiyon konusunda en çok alıntı yapılan makalelere gösterilen toplumsal ilgiyi değerlendirmektir. Altmetrik performans faktörleri, Twitter'de bahsedilenler ve altmetrikler ile geleneksel atıf sayıları arasındaki korelasyon da dahil olmak üzere analiz edildi.

Yöntemler: Dört bin iki yüz kırk perinatal enfeksiyon makalesi arasından Web of Science veri tabanından ve altmetric.com web sitesinden en çok atıf alan 100 makalenin listesini (T100) oluşturduk.

Bulgular: En çok alıntı yapılan makale olan ve Zhu H. tarafından yazılan "2019-nCoV pnömonisi olan annelerden doğan 10 yenidoğanın klinik analizi" Translational Pediatrics Journal'da yayınlandı. T100 listesinde 75 orijinal bilimsel araştırma yayını ve 25 inceleme makalesi yer aldı. Twitter'de T100 yazılarından 80'i paylaşıldı. En çok tweetlenen on makaleden beşi 2019-nCoV, dördü Hepatit B virüsü ve biri ZİKA virüs hakkındaydı. AAS sayısı, ortalama atıf sayısı ve tweet sayısı yıllar arttıkça istatistiksel olarak önemli ölçüde arttı. AAS ile tweet sayısı arasında istatistiksel olarak anlamlı ve güçlü bir ilişki bulundu.

Sonuç: Bu çalışma, mevcut çalışmaların eğilimlerini belirlemek için en etkili yayınları yansıtmakta ve araştırmacılara yardımcı olmak

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for future studies to help researchers. Also, it presents a view on the subject of the level of interest shown by the scientific world on social media platforms to the most cited articles on the subject of perinatal infection.

Keywords: Perinatal infection, altmetric, social media, top-cited article, twitter

için gelecekteki çalışmalar için bazı yönergeler sunmaktadır. Ayrıca perinatal enfeksiyon konusunda en çok atıf alan makalelere bilim dünyasının sosyal medya platformlarında gösterdiği ilgi düzeyi konusunda bir görüş sunmaktadır.

Anahtar Sözcükler: Perinatal enfeksiyon, altmetrik, sosyal medya, en çok atıf alan makale, twitter

Introduction

Infections during pregnancy are more common and complicated due to immigration, international travel, increasing viral morbidity, reduced primary and annual influenza vaccination (1,2). It is possible to prevent perinatal infections by implementing adequate strategies, more sensitive diagnostic techniques, and postnatal retrospective screening programs on time (3).

Citations are the basis for metrics like the h-index and its derivatives, which are used to evaluate the productivity and impact of individual researchers or the impact factor (IF) which is used to evaluate the scientific impact of journals (4-6). Traditionally, assessing the quality of publications based on the number of citations does not precisely reflect the quality (7,8). Bibliometric analysis is a statistical evaluation of scientific publications and provides an effective method to measure and compare the scientific value and impact of articles using a quantitative appraisal of citations, articles, and journals (9,10). A new score called Altmetric Attention Score (AAS) was created to measure the impact of scientific articles on social media (11). The AAS is qualitative data that is complementary to traditional citation-based metrics (12). However, in comparison to traditional citation metrics, altmetrics measure the impact of an article after publication, based on its number of mentions across various online sources. The article's final AAS reflects the summation of these weighted mentions (13). The AAS and the altmetric donut were developed to measure how much and what kind of attention a study received. The color of the source that gives the highest score to the research takes up more place in the donut. Each color on the altmetric donut symbolizes a different source of attention and the altmetric score is written in the donut's center (Figure 1). Social media attention following the publication of an article has previously been shown to correlate with the subsequent citation rate (14,15). Medical journals use social media, including blogs and commercial platforms such as Facebook and Twitter, to share medical information (16,17).

The objective of this study is to provide bibliometric and altmetric overviews and visualizations of the perinatal infection research, as well as to evaluate the association between traditional bibliometric analysis and altmetric analysis. In addition, we aimed to analyze the impact of Twitter on both metrics in terms of scientific knowledge dissemination.

Methods

Study Design

Our research was a retrospective clinical investigation with a level of evidence of three or group B based on the Scottish Intercollegiate Guidelines Network (SIGN) (18). The "perinatal infection" keyword was used in the Web of Science (WoS) Core Collection database (Philadelphia, Pennsylvania, United States) to find the articles (date of access: April 12, 2021) between 2011 and 2021. No language restrictions were set. The data was entered and analyzed using Microsoft Excel files. The IF's of journals were recorded based on the 2019 Clarivate Journal Citation Reports. The quartile (Q) scores and H-index of journals were determined using the 2020 Scimago Journal and Country Rank (19). Study types and levels of evidence were determined using SIGN 100. The bibliometric data of the T100 list (Table 1) was visualized using the VOSviewer software version 1.6.16 (20). The findings of country coupling and keyword co-occurrence analyses were visualized on maps. Altmetric attention scores were obtained by downloading the "Altmetric it" function from the Altmetric.com website (21-24). The website created AAS automatically using a mechanism based on a weighted average of each article's attention. Additionally, we determined how many times each article was shared on Twitter.

Each author certified that the study was conducted following the ethical principles of the Helsinki Declaration. This study did not require ethical approval as it performed bibliometric and altmetric analysis of currently published articles on perinatal infections.

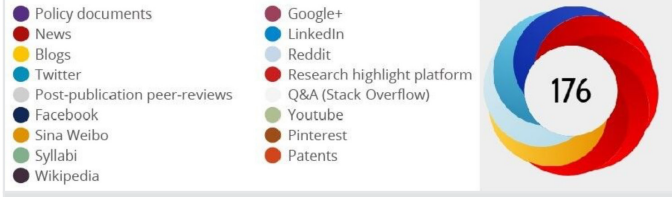

Figure 1. Altmetric donuts the altmetric donut were developed to measure how much and what kind of attention a study receives. The color of the source that gives the highest score to the research takes up more place in the donut. Each color on the altmetric donut symbolizes a different source of attention and the altmetric score is written in the donut's center

Table 1. Top 100 article by metrics (T100 list)

Rank	Title	Publication year	First author	TCN	ACpY	AAS	NT's
1	Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia	2020	Zhu, Huaping	477	238,5	442	249
2	Evidence of perinatal transmission of Zika virus, French Polynesia, December 2013 and February 2014	2014	Besnard, M.	412	51,5	70	2
3	Tenofovir to Prevent Hepatitis B Transmission in Mothers with High Viral Load	2016	Pan, Calvin Q.	258	43	161	104
4	A prospective and open-label study for the efficacy and safety of telbivudine in pregnancy for the prevention of perinatal transmission of hepatitis B virus infection	2011	Han, Guo-Rong	245	22,27	9	0
5	The global burden of listeriosis: a systematic review and meta-analysis	2014	de Noordhout, Charline Maertens	233	29,13	60	13
6	Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices	2018	Schillie, Sarah	212	53	197	178
7	Congenital Zika Virus Infection Beyond Neonatal Microcephaly	2016	de Oliveira Melo	196	32,67	233	85
8	Vertical Transmission of Hepatitis C Virus: Systematic Review and Meta-analysis	2014	Benova, Lenka	170	21,25	33	19
9	Maternal and perinatal outcomes with COVID-19: A systematic review of 108 pregnancies	2020	Zaigham,Mehreen	169	84,5	676	762
10	Antiviral therapy in chronic hepatitis B viral infection during pregnancy: A systematic review and meta-analysis	2016	Brown, Robert S	162	27	19	6
11	Understanding the mental health of youth living with perinatal HIV infection: lessons learned and current challenges	2013	Mellins, Claude A	156	17,33	5	2
12	Mother-to-infant transmission of hepatitis B virus infection: Significance of maternal viral load and strategies for intervention	2013	Wen, Wan-Hsin	152	16,89	2	2
13	Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection	2011	Siegfried, Nandi	146	13,27	7	2
14	HIV-Specific Antibodies Capable of ADCC Are Common in Breastmilk and Are Associated with Reduced Risk of Transmission in Women with High Viral Loads	2012	Mabuka, Jennifer	145	14,5	34	5
15	An Algorithm for Risk Assessment and Intervention of Mother to Child Transmission of Hepatitis B Virus	2012	Pan, Calvin Q.	140	14	0	0
16	Estimating the Probability of Neonatal Early-Onset Infection on the Basis of Maternal Risk Factors	2011	Puopolo, Karen M	140	12,73	3	2
17	Effects of Maternal Screening and Universal Immunization to Prevent Mother-to-Infant Transmission of HBV	2012	Chen, Huey-Ling	139	13,9	5	1
18	Efficacy of maternal tenofovir disoproxil fumarate in interrupting mother-to-infant transmission of hepatitis B virus	2015	Chen, Huey-Ling	136	19,43	15	19
19	Neonatal sepsis: Progress towards improved outcomes	2014	Shane, Andi L.	136	17	4	
20	Intrapartum antibiotic prophylaxis for the prevention of perinatal group B streptococcal disease: Experience in the United States and implications for a potential group B streptococcal vaccine	2013	Schrag, Stephanie J	136	15,11	34	9
21	Listeriosis in human pregnancy: a systematic review	2011	Lamont, Ronald F	134	12,18	11	0

Table 1. Continued

Rank	Title	Publication year	First author	TCN	ACpY	AAS	NT's
23	Tenofovir versus Placebo to Prevent Perinatal Transmission of Hepatitis B	2018	Jourdain, G	125	31,25	177	197
24	Three Postpartum Antiretroviral Regimens to Prevent Intrapartum HIV Infection	2012	Nielsen-Saines, Karin	120	12	59	56
25	Strategies to control hepatitis B: Public policy, epidemiology, vaccine and drugs	2015	Locarnini,Stephen	117	16,71	4	6
26	Early antiretroviral therapy improves neurodevelopmental outcomes in infants	2012	Laughton, Barbara	114	11,4	6	1
27	No Perinatal HIV-1 Transmission From Women With Effective Antiretroviral Therapy Starting Before Conception	2015	Mandelbrot,Laurent	111	15,86	13	4
28	Efficacy and safety of tenofovir disoproxil fumarate in pregnancy to prevent perinatal transmission of hepatitis B virus	2014	Greenup,Astrid-Jane	107	13,38	17	3
29	Telbivudine Prevents Vertical Transmission From HBeAg-Positive Women With Chronic Hepatitis B	2012	Pan, Calvin Q	107	10,7	9	0
30	Neonatal Infection and 5-year Neurodevelopmental Outcome of Very Preterm Infants	2013	Mitha, Ayoub	103	11,44	3	3
31	TORCH Infections	2015	Neu, Natalie	102	14,57	7	1
32	Prevention of Chronic Hepatitis B after 3 Decades of Escalating Vaccination Policy, China	2017	Cui, Fuqiang	99	19,8	9	8
33	Trichomonas vaginalis as a Cause of Perinatal Morbidity: A Systematic Review and Meta-Analysis	2014	Silver, Bronwyn J	99	12,38	22	2
34	Neurocognitive Outcome of Children Exposed to Perinatal Mother-to-Child Chikungunya Virus Infection: The CHIMERE Cohort Study on Reunion Island	2014	Gerardin, Patrick	98	12,25	75	12
35	Telbivudine or Lamivudine Use in Late Pregnancy Safely Reduces Perinatal Transmission of Hepatitis B Virus in Real-Life Practice	2014	Zhang, Hua	95	11,88	15	4
36	Epidemiology of Hepatitis B Virus Infection and Impact of Vaccination on Disease	2016	Nelson, Noele P	92	15,33	5	11
37	Impact of HIV Severity on Cognitive and Adaptive Functioning During Childhood and Adolescence	2012	Smith, Renee	92	9,2	1	2
38	Policy Statement-Recommendations for the Prevention of Perinatal Group B Streptococcal (GBS) Disease	2011	Baker, Carol J	92	8,36	13	
39	Tenofovir Disoproxil Fumarate for Prevention of Vertical Transmission of Hepatitis B Virus Infection by Highly Viremic Pregnant Women: A Case Series	2012	Pan, Calvin Q	89	8,9	3	0
40	A national review of vertical HIV transmission	2012	Forbes, John C	85	8,5	6	4
41	Maternal hepatitis B and hepatitis C carrier status and perinatal outcomes	2011	Connell, Laura E	75	6,82	0	0
42	Antiretroviral Drugs in the Cupboard are Not Enough: The Impact of Health Systems' Performance on Mother-to-Child Transmission of HIV	2011	Barker, Pierre M	75	6,82	3	0
43	Hepatitis B in sub-Saharan Africa: strategies to achieve the 2030 elimination targets	2017	Spearman, C.Wendy	74	14,8	13	20
44	Effect of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcome: systematic review	2020	Juan, J.	73	36,5	37	
45	Factors associated with vaccine failure and vertical transmission of hepatitis B among a cohort of Canadian mothers and infants	2011	Singh, A. E	71	6,45	8	1

Table 1. Continued

Rank	Title	Publication year	First author	TCN	ACpY	AAS	NT's
47	Hepatitis C in pregnancy: screening, treatment, and management	2017	Hughes, Brenna L.	68	13,6	30	41
48	Hepatitis B in pregnancy screening, treatment, and prevention of vertical transmission	2016	Dionne-Odom, Jodie	67	11,17	24	32
49	The challenges of success: adolescents with perinatal HIV infection	2013	Mofenson, Lynne M	67	7,44	1	2
50	A Framework for Elimination of Perinatal Transmission of HIV in the United States	2012	Nesheim, Steven	67	6,7	6	0
51	Perinatal outcomes associated with maternal HIV infection: a systematic review and meta-analysis	2016	Wedi, Chrystelle O.	66	11	33	24
52	The risk of perinatal hepatitis B virus transmission: hepatitis B e antigen (HBeAg) prevalence estimates for all world regions	2012	Ott, Joerdis J.	66	6,6	17	10
53	COVID-19 in Children, Pregnancy and Neonates: A Review of Epidemiologic and Clinical Features	2020	Zimmermann, Petra	65	32,5	969	23
54	Human Cytomegalovirus Infant Infection Adversely Affects Growth and Development in Maternally HIV-Exposed and Unexposed Infants in Zambia	2012	Gompels, U. A.	65	6,5	3	2
55	Impact of Middle East Respiratory Syndrome coronavirus (MERS-CoV) on pregnancy and perinatal outcome	2016	Alserehi, Haleema	64	10,67	60	65
56	Prevention of Vertical Transmission of Hepatitis B An Observational Study	2014	Kubo, Ai	64	8	61	20
57	An Epidemiologic Update on Hepatitis C Infection in Persons Living With or at Risk of HIV Infection	2013	Kim, Arthur Y	64	7,11	0	0
58	Hepatitis C Virus in Pregnancy	2013	Prasad, Mona R.	64	7,11	0	0
59	A systematic scoping review of COVID-19 during pregnancy and childbirth	2020	Elshafeey, Farida	63	31,5	177	210
60	Cesarean Section Reduces Perinatal Transmission of Hepatitis B Virus Infection From Hepatitis B Surface Antigen-Positive Women to Their Infants	2013	Pan, Calvin Q	63	7	8	4
61	Outcomes of Infants Born to Women Infected With Hepatitis B	2015	Schillie, Sarah	62	8,86	30	28
62	Antiretroviral Treatment of US Children With Perinatally Acquired HIV Infection: Temporal Changes in Therapy Between 1991 and 2009 and Predictors of Immunologic and Virologic Outcomes	2011	Van Dyke, Russell B	62	5,64	0	0
63	Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis	2020	Allotey, John	61	30,5	1307	743
64	Efficacy and safety of tenofovir disoproxil fumarate in pregnancy for the prevention of vertical transmission of HBV infection	2013	Celen, Mustafa Kemal	61	6,78	60	0
65	Anti-viral therapy for prevention of perinatal HBV transmission: extending therapy beyond birth does not protect against post-partum flare	2014	Nguyen, V	59	7,38	3	5
66	Group B streptococcal epidemiology and vaccine needs in developed countries	2013	Melin, Pierrette	59	6,56	0	0
67	Longitudinal Study of Emerging Mental Health Concerns in Youth Perinatally Infected With HIV and Peer Comparisons	2012	Gadow, Kenneth D	59	5,9	2	3
68	Middle East Respiratory Syndrome Coronavirus Infection During Pregnancy: A Report of 5 Cases From Saudi Arabia	2016	Assiri, Abdullah	58	9,67	20	15

Table 1. Continued

Rank	Title	Publication year	First author	TCN	ACpY	AAS	NT's
70	Correlates of Mother-to-Child Transmission of HIV in the United States and Puerto Rico	2012	Whitmore, Suzanne K	58	5,8	4	1
71	Hepatitis C virus infection during pregnancy and the newborn period - are they opportunities for treatment?	2011	Arshad, M	58	5,27	6	0
72	Prognostic markers of symptomatic congenital human cytomegalovirus infection in fetal blood	2011	Fabbri, E	57	5,18	0	0
73	Chronic hepatitis B in Asia-new insights from the past decade	2011	Chan, Henry Lik-Yuen	57	5,18	3	0
74	Hepatitis C Virus Infection Among Women Giving Birth - Tennessee and United States, 2009-2014	2017	Patrick, Stephen W	56	11,2	272	78
75	Integrated prevention of mother-to-child transmission for human immunodeficiency virus, syphilis and hepatitis B virus in China	2015	Wang, Ai-Ling	56	8	4	0
76	Influence of Age at Virologic Control on Peripheral Blood Human Immunodeficiency Virus Reservoir Size and Serostatus in Perinatally Infected Adolescents	2014	Persaud, Deborah	56	7	6	10
77	Cytomegalovirus-specific T-cell reactivity in biliary atresia at the time of diagnosis is associated with deficits in regulatory T cells	2012	Brindley, Stephen M	56	5,6	1	1
78	Performance of HIV-1 DNA or HIV-1 RNA Tests for Early Diagnosis of Perinatal HIV-1 Infection during Anti-Retroviral Prophylaxis	2012	Burgard, Marianne	56	5,6	5	0
79	An Analysis of 38 Pregnant Women With COVID-19, Their Newborn Infants, and Maternal-Fetal Transmission of SARS-CoV-2	2020	Schwartz, David A.	55	27,5	457	341
80	Chronic hepatitis B infection in adolescents who received primary infantile vaccination	2013	Wu, Tzu-Wei	55	6,11	90	88
81	Hepatitis B virus and human immunodeficiency virus drugs in pregnancy: Findings from the Antiretroviral Pregnancy Registry	2012	Brown, Robert S	54	5,4	7	6
82	Clues to the Etiology of Bile Duct Injury in Biliary Atresia	2012	Mack, Cara L.	54	5,4	1	1
83	Cytomegalovirus-associated biliary atresia: An aetiological and prognostic subgroup	2015	Zani, Augusto	53	7,57	2	3
84	Maternal-fetal transmission and adverse perinatal outcomes in pregnant women infected with Zika virus: prospective cohort study in French Guiana	2018	Pomar, Leo	52	13	69	98
85	HIV-Associated Cognitive Impairment in Perinatally Infected Children: A Meta-analysis	2016	Phillips, Nicole	52	8,67	17	
86	The National Perinatal Hepatitis B Prevention Program, 1994-2008	2012	Smith, Emily A.	52	5,2	21	7
87	Testing for Zika virus infection in pregnancy: key concepts to deal with an emerging epidemic	2017	Eppes, Catherine	51	10,2	34	40
88	Estimated Number of Infants Born to HIV-Infected Women in the United States and Five Dependent Areas, 2006	2011	Whitmore, Suzanne K.	51	4,64	0	0
89	Failure to Test and Identify Perinatally Infected Children Born to Hepatitis C Virus-Infected Women	2016	Kuncio, Danica E	49	8,17	27	8
90	The effects of telbivudine in late pregnancy to prevent intrauterine transmission of the hepatitis B virus: a systematic review and meta-analysis	2012	Deng, Min;	49	4,9	1	3
91	Hepatitis B and C in pregnancy: a review and recommendations for care	2014	Dunkelberg, J. C.	48	6	20	14

Table 1. Continued

Rank	Title	Publication year	First author	TCN	ACpY	AAS	NT's
93	Human Immunodeficiency Virus Disease Severity, Psychiatric Symptoms, and Functional Outcomes in Perinatally Infected Youth	2012	Nachman, Sharon	48	4,8	7	7
94	Mother-to-Infant Transmission of Hepatitis B Virus: A Chinese Experience	2011	Shao, Zhong-Jun	47	4,27	0	0
95	Antiviral Therapy for Chronic Hepatitis B in Pregnancy	2013	Pan, Calvin Q	46	5,11	9	13
96	Optimal Time on HAART for Prevention of Mother-to-Child Transmission of HIV	2011	Chibwesha, Carla J	46	4,18	6	5
97	Congenital and perinatal complications of chikungunya fever: a Latin American experience	2016	Torres, Jaime R.	45	7,5	28	30
98	Risk of vertical transmission of hepatitis B after amniocentesis in HBs antigen-positive mothers	2014	Yi, Wei	45	5,63	0	
99	Perinatal Infections and Neurodevelopmental Outcome in Very Preterm and Very Low-Birth-Weight Infants A Meta-Analysis	2013	van Vliet, Elvira O	44	4,89	18	20
100	Perinatal aspects on the covid-19 pandemic: a practical resource for perinatal-neonatal specialists	2020	Mimouni, Francis	43	21,5	69	87

TCN: Total citation number, ACpY: Average citation per year, AAS: Altmetric attention score, NTs: Number of tweet

Table 2. Study types and level of evidence by SIGN

Type-subtype	Number of articles	Level of Evidence	AAS M (Q1- Q3)	TCN M(Q1-Q3)	ACN M (Q1-Q3)	NT M(Q1-Q3)
Meta-analysis, systematic review	16	1	30.5 (17-60)	117 (66-162)	15.7 (11.4-30.5)	16 (2- 56)
Randomized controlled trial	5	1				
Randomized clinical trial	1	1				
Prospective cohort study	12	2	7 (3-21.5)	60.5 (51.5-96.5)	7.44 (5.5-11.66)	4.5 (0-15.5)
Ambispective cohort study	1	2				
Non-randomized clinical trial	1	2				
Retrospective cohort study	9	3	6 (2-27)	61 (55-107)	6.82 (5.8 -12.73)	3 (1-8)
Case-control study	9	3				
Case reports	3	3				
Case Series	3	3				
Cross-sectional study	4	3				
Comparative study	4	3				
Review	24	4	9 (4-34)	67 (57-102)	11.17 (7.11-16.71)	6 (0-32)
Practice guideline	6	4				
Editorial	1	4				
Historical article	1	4				
p-value			0.024	0.090	0.001	0.079

TCN: Total citation number, ACN: Average citation number, AAS: Altmetric attention score, NT: number of tweets, M [Q1 Q3]. M: Median, Q1: Quartile 1 (p25), Q3: Quartile 3 (p75), P-value was obtained from Kruskal-Wallis or Mann-Whitney U test Scottish Intercollegiate Guidelines Network (SIGN)*

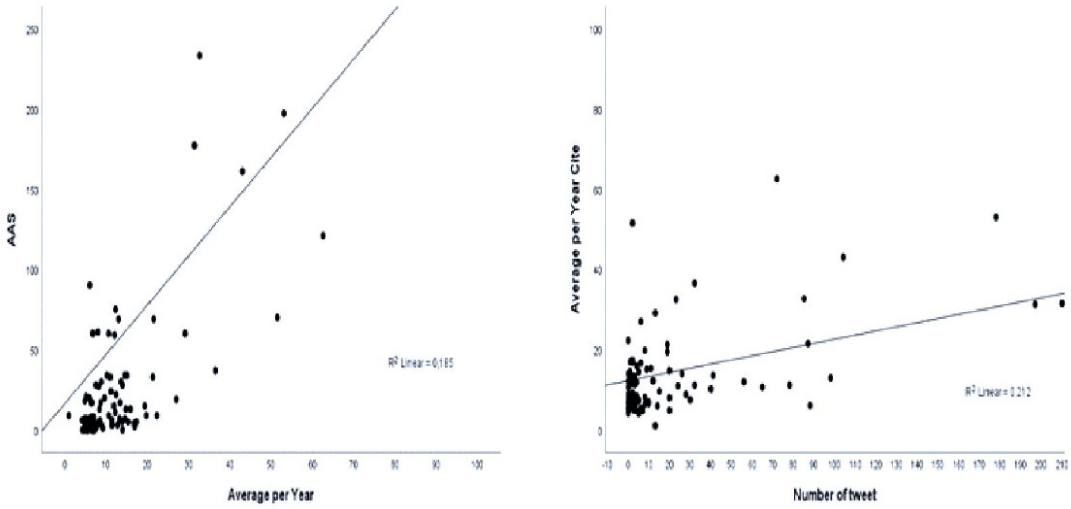

Figure 2. Scatter plot of the relationship between altmetric score average citations per year and number of tweets. There was a strong positive correlation between AAS and the average per year. There was a strong positive correlation between the average of per year and Tweet

Table 3. Top-100 cited articles according to subject categories

Subject categories	Number of articles	AAS median (IQR)	Total cita. median (IQR)	Avarage cita. median (IQR)	Tweet median (IQR)
Transmission risk factors	23	7 (3-30)	111 (62-140)	12,73 (6.78 -15,.86)	2 (1-19)
Epidemiology	19	27 (3-60)	59 (52-68)	10.2 (6.6-15,33)	11 (0-40)
Prevention	18	13 (4-21)	93.5 (64-117)	11.53 (8-16.71)	5.5 (2-9)
Clinical features	16	64.5 (15.5-205)	66.5 (59.5-151.5)	26 (10.17-44)	48.5 (10-148.5)
Perinatal outcomes	12	5.5 (2.5-19)	83.5 (55.5-101)	93 (6.25-11.84)	2 (2-7.5)
Diagnostic methods	3	1 (0-5)	56 (56-57)	5.6 (5.18-5.6)	0 (0-1)
Others	9	2 (1-7)	54(53-56)	6,11 (5.4-7)	4 (2-8)
P value		0.001	0.004	0.001	0.014

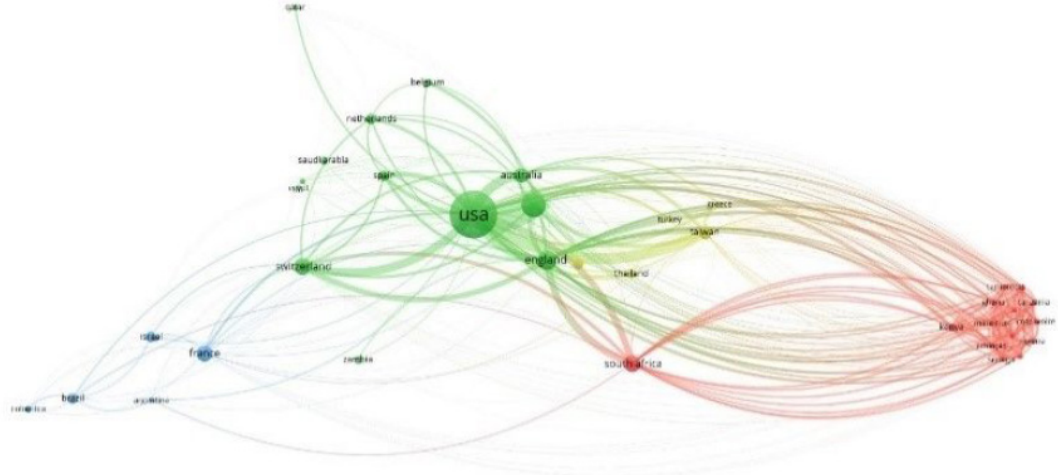

Figure 3. Distribution and intersection points of top 100 cited articles. Countries analyses were performed. For each of the 41 countries on the T100 list, the total strength of bibliographic coupling linkages with other countries was measured and visualized

Statistical Analysis

All analyses were performed by IBM SPSS for windows version 23.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were described using the median and interquartile range (IQRs), whereas categorical variables were defined using percentages. The comparative analysis of the parameter values according to the publication years and main subject were made with the Kruskal-Wallis test and the post hoc tests were made with the Dunn test. Mann-Whitney U test was used for comparisons based on Q categories. The Shapiro-Wilk test was used to determine the parameters' conformity to the normal distribution. Sperman or Pearson correlation coefficients were calculated to detect the linear relationship between numerical variables. Beta coefficients were estimated by univariate linear regression analysis. $P<0.05$ was considered statistically significant.

Results

Using the term "infection" in the WoS search, we found 852,880 publications between 2011 and 2021. Later, the term "perinatal" was added and the total number of publications decreased to 4240. All of the articles on the T100 list were published in English.

Total Citation Number (TCN) and AAS Analysis

The median values for TCN and AAS scores were 4.5 (IQR 43-477) and 172 (IQR 0-1307), respectively in the T100 list. The citation number was ranked between 477 and 43. The T100 list was ranked between AAS 1,377 and 0. There were ten articles on the T100 list that did not have AAS yet. The most cited article was published by Zhu et al. (25) in April 2020 and received

Table 4. Distrubition of microorganisms

Microorganism	n	%
HBV	35	35.7
HIV	24	24.5
nCoV	9	9.2
HCV	7	7.1
CMV	5	5.1
ZIKA virus	5	5.1
GBS	4	4.1
Chikungunya virus	2	2.0
Listeria	2	2.0
MERS-CoV	2	2.0
TORCH	1	1.0
Trichomonas vaginalis	1	1.0
Bacterial infection	1	1.0

HBV: Hepatit B virus, HIV: Human immunodeficiency virus, nCoV: Nex Covid, HCV: Hepatit C virus, CMV: Cytomegalovirus, GBS: Guillain-Barré syndrome, MERS-CoV: Middle East respiratory syndrome-covid, TORCH: Toxoplasma gondii

Table 5. Correlation analysis

		Total citations	Number of tweets	Average per Year	Number of years since publication	H index	Journal impact factor	Q kategory	
AAS	r	0.157	0.808**	0.430**	-0.575**	0.064	0.136	0.074	
	p	0.118	0.001	0.001	0.001	0.524	0.184	0.462	
Total citations	r	1	0.167	0.748**	-0.152	0.085	0.209*	0.223*	
	p		0.097	0.001	0.132	0.398	0.040	0.026	
Number of tweets	r		1	0.461**	-0.572**	0.098	0.184	0.102	
	p			0.001	0.001	0.331	0.071	0.312	
Average per year	r			1	-0.505**	-0.067	0.055	0,378**	
	p				0.001	0.507	0.594	0.001	
Number of years since the publication	r				1	0.001	-0.132	-0.060	
	p					1.000	0.197	0.552	
H index	r					1	0.840**	-0.186	
	p						0.001	0.065	
Journal impact factor	r						1	-0.135	
	p							0.187	

a TCN of 477 and AAS of 442 at the Translational Pediatrics journal. The article by Allotey et al. (26) had the highest value with 1307 AAS on the T100 list and it was published in British Medical Journal. The four of the articles with the highest AAS were among the top 10 articles with the highest CN.

Twitter Analysis

On Twitter, 80 articles from the T100 list were found to be shared. Of the ten most tweeted articles, five were about 2019-nCoV, four were about Hepatitis B virus (HBV), and one was about Zikavirus. The most-tweeted article was "Maternal and perinatal outcomes with COVID-19: A systematic review of 108 pregnancies" with 762 retweets (27).

Journal Perspective

The T100 articles were published in 59 journals with the number of articles per journal ranging from 1 to 8. Pediatrics, Clinical Infectious Diseases, and Journal of Hepatology were the three leading journals in which the majority of the articles were published. The most cited journal was Translational Pediatrics with 477 citations, followed by Eurosurveillance with 412 citations and New England Journal of Medicine with 258 citations. The most tweeted articles were published in Acta Obstetrıcıa et Gynecologıca Scandinavica, British Medical Journal and Archives of Pathology & Laboratory Medicine, respectively. According to SJCR, all journals received Q1 scores, except for five journals that received Q2 scores.

Article Types

The 75 articles on the T100 list were original scientific researches and 25 articles were review articles (Table 2). Also, there were 16 meta-analyses and 5 randomized controlled trials. The AAS values of studies with evidence level 1 were found to be statistically significantly higher than those with level 3 (p=0.024). Studies with evidence level 1 had statistically substantially higher average and total citation values than studies with evidence levels 2 and 3 (p<0.05).

Research Topics

When we evaluated the T100 list in terms of the main topic, the majority of articles were related to risk factors for transmission (n=23), epidemiology (n=19), prevention (n=18), clinical features, and outcomes (n=16) of perinatal infections (Table 3). The most frequent microorganisms were HBV, followed by human immunodeficiency virus (HIV) and 2019-nCoV (Table 4).

Distribution of Countries

The 100 top-cited perinatal infections articles were from 41 countries. The United States had the highest total number of publications (59), followed by China (16), England (10), Switzerland and South Africa (8), France (7) and Australia (6). The country with the most citations was the USA with 5193 citations, followed by China with 1997 citations and France with 957 citations.

Correlation Analysis

The number of AAS, average citations, and the number of tweets increased statistically significantly as the years increased (p<0.001). The AAS numbers, total citation number, the average citation, and tweet counts of studies with main subjects "clinical features" and "outcomes" were found to be statistically significantly higher than studies on other subjects (p<0.05). A statistically significant and strong correlation was found between AAS and the number of tweets (r=0.808, p=0.001). As the number of tweets got higher, the AAS was likely to increase as a consequence. There was a positive correlation between AAS and the average per year, and a negative statistically significant

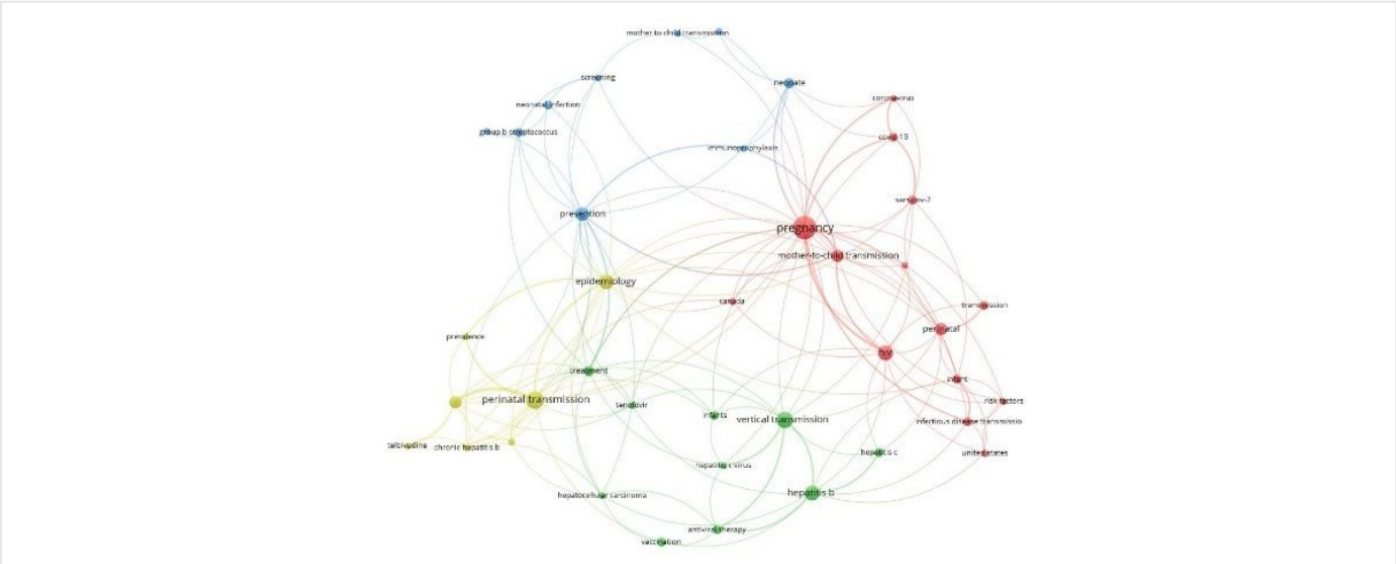

Figure 4. Distribution and intersection points of top 100 cited articles Co-occurrence analysis of high-frequency keywords was performed. The minimal number of keyword co-occurrences criteria was chosen to be 2. The criteria were met by 25 of the 43 retrieved keywords related to perinatal infection. The network was used to cluster related keywords, and the five major clusters were represented by the colors, red, green, blue, yellow, and purple, respectively

moderate correlation between AAS and the variable of the number of years since publication ($p<0.05$). A statistically significant weak correlation was found between the journal IF and total citation numbers ($r=0.209$, $p=0.040$). A statistically significant and strong correlation was found between the journal IF and the h index ($r=0.840$, $p=0.001$). Positive and statistically significant weak correlations were found between the Q category, total citation number and average per year ($p<0.05$).

The correlation between AAS, TCN, NYsP, and journal IF, H-index, and Q categories are shown in Table 5. There was a strong positive correlation between AAS and the average per year ($r=0.430$; $p=0.001$) and there was a strong positive correlation between the average of per year and the number of tweets ($r=0.461$; $p=0.001$) (Figure 2).

Visualization Analysis

For each of the 41 countries on the T100 list, the total strength of bibliographic coupling linkages with other countries was measured and visualized (Figure 3). Large nodes refer to countries that are productive and efficient. The degree of communication and collaboration across nations is shown by the thickness and distance of linkages between nodes (28). United States Department of Health Human Services (28), National Institutes of Health Nih USA (25), and Nih National Institute of Allergy Infectious Diseases Niaid (13) were the leading institutions. Co-occurrence analysis of high-frequency keywords was performed. The minimal number of keyword co-occurrences criteria was chosen to be 2. The criteria were met by 25 of the 43 retrieved keywords related to perinatal infection. The network was used to cluster related keywords, and the five major clusters were represented by the colors, red, green, blue, yellow, and purple, respectively (Figure 4). "Pregnancy" and "perinatal transmission" were the most frequently used keywords.

Discussion

In previous studies, AAS was detected at different ranges. Moon et al. (29) found the AAS between 7,301-34,789 in their study. Li et al. (30) stated AAS values between 57 and 1. We found the AAS values between 1,377 and 0. We found that there was no correlation between TCN and AAS as Celik et al. (31) did not find. The wide spectrum of AAS is because articles on the T100 list do not get the same level of attention in social media.

Our findings show that epidemiological studies investigating the prevalence, clinical features, and outcomes of perinatal infections have attracted great interest both in the academic community and in social media. The AAS increases in response to both positive and negative comments, this should also be considered in the assessment. Even if an article receives few citations, it might gain a lot of attention on social media. The article by Allotey et al. (26) had AAS of 1,307, but it was only 61 times cited. This can be attributed to the subject of the article attracting social media attention. Only the four of the articles with the highest AAS were among the top 10 articles with the highest TCN.

Altmetric attention scores and the number of tweets had a weak positive correlation with average citation per year (ACpY). This means that articles which have been cited regularly over the years and remain relevant are more valuable on social media and Twitter. Furthermore, despite analyzing only the last decade, we found a strong negative correlation between the "AAS" of the T100 articles and the number of years since publication. The rising number of social media users globally, as well as social media's growing interest in studies about the perinatal infections literature in the last few years, might explain these findings.

The "level of evidence" indicates how likely it is that a research paper's conclusions are correct. It is related to the study's design and how well it is carried out. The highest AAS and total citation number values were found in articles with the level of evidence 1 in our study, as expected. The h-index is a scientometric indicator at the researcher level that is based on a simple combination of publication and citation counts. In this article, we found a statistically significant and strong correlation between the journal IF and the h index. One thing to remember about the h-index is that it correlates with the length of a researcher's career and it can also be inflated by self-citation.

In our study, we determined a statistically significant weak correlation between the journal IF and total citation number. Also, we found that there was no correlation between IF and AAS or the number of tweets. The fact that AAS and number of tweets were positively correlated with ACpY might explain this situation. The IF would only measure the interests of other researchers in an article, not its value and usefulness. Previous studies have discovered that journals with social media accounts such as Twitter has significantly higher AAS than those without (32) and that tweets can predict highly cited articles within the first 3 days of article publication. When we investigated the relationship between AAS and average citation per year, we discovered that articles that drew attention in the academic community retained their relevance in social media.

Almost half of the included articles were from the USA and China which was consistent with previous studies (33,34). This may be closely related to the influence and scientific output of the field of perinatal infection in the USA and China. The developed countries such as the USA pay more attention to the topic and have more funding. If we consider China, it is the country where the COVID pandemic started and spread to the world.

Study Limitations

Current definitions of altmetrics are shaped and limited by active platforms, technical capabilities, and the Altmetric.com website. Given Altmetric does not include all media sources and the relationship between AAS and citations may change over time. First, the current study was only based on journal studies from the WoS database. Therefore, there might be some overlooked literature. When we analyzed the origin country, our study was based on the institution address of the corresponding author if the author changed the address, there might be statistical bias. Altmetrics do not cover the demographics of scientists and the nature of each mention (positive or negative) Furthermore, the

reliability of commenters and the veracity of their opinions are under doubt due to the ease with which internet data may be manipulated.

Conclusion

There is no study examining the 100 most cited articles on perinatal infections. This study reflects the most influential publications to identify the trends of current studies and provides some directions for future studies to help researchers. Also, it presents a view on the subject of the level of interest shown by the scientific world on social media platforms to the most cited articles on the subject of perinatal infections.

Ethics

Ethics Committee Approval: Each author certified that the study was conducted following the ethical principles of the Helsinki Declaration. This study did not require ethical approval as it performed bibliometric and altmetric analysis of currently published articles on perinatal infections.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: D.B., H.B., Design: D.B., H.B., Data Collection or Processing: D.B., H.B., Analysis or Interpretation: D.B., H.B., Literature Search: D.B., H.B., Writing: D.B., H.B.

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