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Original Article

The scientific progress and prospects of hepatitis C research from 2013 to 2022

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Abstract: Background and objective: Hepatitis C (HC) is a global health issue, with an estimated 350,000 people dying annually from this liver-related disease. This study determined the development trends and research hotspots regarding HC by investigating the related articles within the past ten years. Methods: Publications on HC were retrieved from the Web of Science Core Collection (WoSCC) on June 6, 2022. Bibliometric visualization was conducted through VOSviewer and CiteSpace. Original articles and reviews served as the foundation for this analytical research. Results: Of the total 17,773 records of HC research published from 2013 to 2022, the top 1,000 articles were retrieved and distributed among 78 countries and 270 journals. The US, where 7 of the top 10 institutions were located, mainly contributed to the study (51.9%). Johns Hopkins University distributed the most related articles (45 articles). Hepatology (IF 2021 = 17.298) ranked first, with 109 articles in the top 10 journals. Dore GJ was the most productive author (40 articles). The keywords of sustained virologic response, therapy, sofosbuvir, cirrhosis, ledipasvir, and hepatocellular carcinoma offered hints regarding research hotspots. The burst keywords regarding the virus, like HCV, HIV, and care and intervention showed as research frontiers. Conclusions: Treatment has been a trending topic in HC research, and future research may focus more on HCV and HIV co-infection, treatment, and elimination of HC.

Keywords: Hepatitis C, VOSviewer, CiteSpace, visualization, hotspots

Introduction

Hepatitis C (HC) is a type of liver inflammation caused by the hepatitis C virus (HCV), with an estimated liver-related mortality of 350,000 individuals each year [1]. Globally, nearly 170 million people are estimated to be infected with HCV, with Asian countries accounting for more than 40% of infected cases [2]. Geographically, the global distribution of the HCV genotype differs. For example, Genotype 1 (GT1) is predominant in the USA, Europe, Australia, and Japan, Genotype 3 (GT3) is more prevalent in Pakistan, whereas Genotype 4 (GT4) is the most common in Egypt and North Africa [3-5]. Although some acute HCV infection is self-limiting, 60-80% of these patients develop a chronic condition when the virus overcomes the host's innate and adaptive immune defenses [6-9].

Liver disease is the most common and severe complication in patients chronically infected with HC. In such cases, the rate of progression to cirrhosis may also vary according to geographical location. In the USA and Europe, the rate of progression to cirrhosis within 20-30 years is approximately 15%, and the annual incidence of hepatocellular carcinoma (HCC) ranges from 1-4% [10-13]. However, in Japan, the rate of progression to cirrhosis in HC is higher, ranging from 30-46% [14].

As a global health challenge, HC requires a high-burden treatment option for patients, healthcare systems, and governments. Therefore, the Global Health Sector Strategy was adopted in 2016, proposing the elimination of HC infection by 2030 [15]. The World Health Organization (WHO) established worldwide objectives for HC

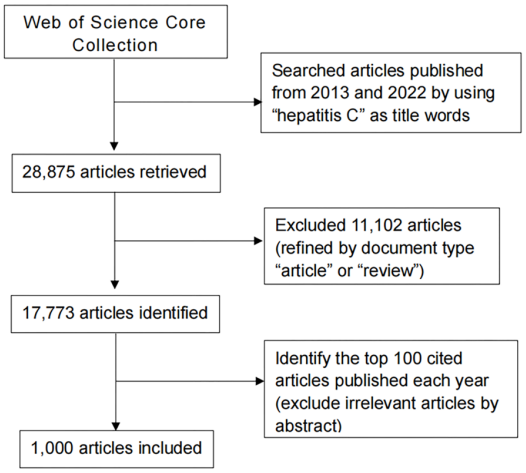

Figure 1. A flowchart representing search strategies from the Web of Science Core Collection (WoSCC) database.

management, including a 90% decrease in new cases of chronic HC, a 65% reduction in HC-related deaths, and treatment of 80% of eligible patients with chronic HC infections [15].

Currently, no bibliometric analysis has evaluated research hotspots and deficiencies in the HC field. Herein, we conducted a study to reveal the scientific progress and prospects of HC research from 2013 to 2022 by using bibliometric methods, facilitating and presenting new inspiration for researchers to detect developing trends in the evolution of this field.

Materials and methods

Data collection and search strategy

Data were retrieved from the Web of Science Core Collection (WoSCC) on a single day, June 6, 2022. WoSCC is a comprehensive database, particularly of natural science and medicine, which provides extensive citation index information for over 8,000 influential and famous journals worldwide. Several prior studies have used this database as a data source [16, 17]. We included the following in the search strategy: title 0 - "hepatitis C"; database selected - Web of Science Core Collection; time span - 2013-2022. Only original articles and reviews were included. We obtained 17,773 records and screened the literature for the top 100 citations per year, which resulted in 1,000 records used in this study. A flowchart representing retrieval strategies is shown in **Figure 1**.

Analysis tool

Microsoft Excel 2016, VOSviewer, and CiteSpace were chosen for bibliometric analysis. Information about authors, journals, institutions, and countries can be integrated into these systems. Some parameters, such as article counts, the impact factor (IF), and occurrence/citation burst, were used in this study. Productivity was measured by the published article numbers and identified productive individuals or groups. The IF, a recognized metric for assessing the worldwide impact of a journal, was obtained using Journal Citation Reports (JCR) 2021.

The network visualization maps were constructed using VOSviewer to examine the cooperative relationships with highly co-cited references. Co-authorship analysis identifies research output. We selected "countries", "organizations", and "authors" as the unit of analysis. The parameters of the VOSviewer were set as follows: type of analysis - co-authorship; unit of analysis - countries; counting method - full counting; minimum documents of a country - 1; visualization method - Linlog/modularity. The same method was used to analyze "institutions" and "authors". The only difference was we selected at least 5 and 3 minimum documents to analyze "institutions" and "authors", respectively.

CiteSpace adopts a time-slicing technique to create a timeline of network models and integrates these individual networks to produce an overview network for the systematic analysis of the relevant publications. We used CiteSpace to perform a co-citation analysis of references and clusters. Further, a time zone visualization map of co-occurring keywords was built. As a result, we could clarify the origin and period of certain clustering fields [18]. A node's centrality predicts its importance in a network, and a node with a high centrality is often viewed as a crucial point in a field [19]. These parameters help identify potential collaborative relationships in liver cirrhosis. Furthermore, the occurrence burst refers to a word that often emerges during a given period, whereas citation burst denotes a reference frequently referenced during a specific period [20, 21]. Keywords with the highest citation bursts were chosen to illustrate research hotspots and frontiers because they indicate that relevant researchers have

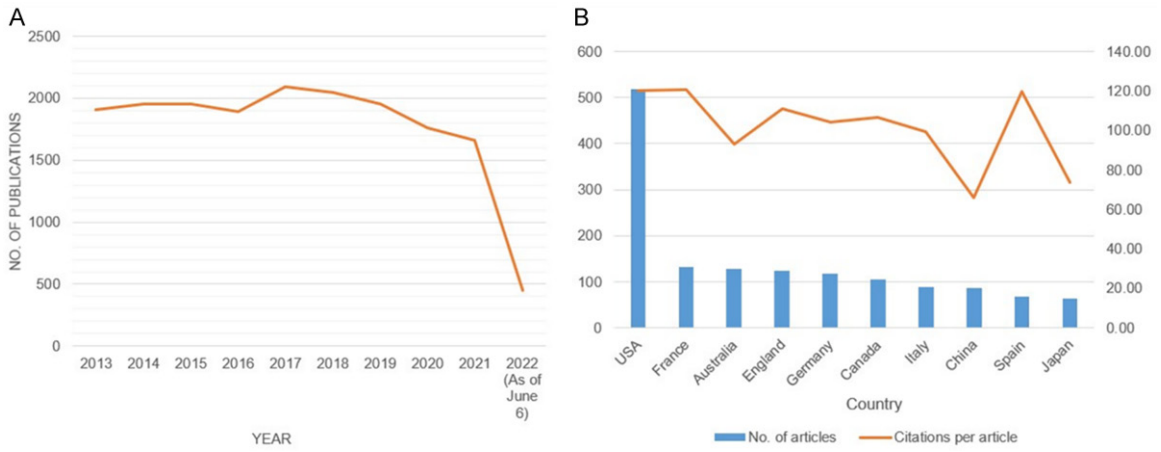

Figure 2. Trends of the annual worldwide publication output of hepatitis C research. A. The yearly trends of all articles retrieved. B. Distribution of top 1,000 articles by countries.

given substantial attention to these topics during a certain period [22]. The parameters of CiteSpace were set as follows: method - LLR; time slicing - 2013-2022; years per slice - 1.

Results

Publication output

Figure 2A shows the distribution of yearly publications on the total 17,773 HC research articles from 2013 to 2022. The academic output was the most in 2017 (2,087 articles) but dropped afterward. We selected the top 1,000 articles based on citation numbers for further analysis. **Figure 2B** shows the number of articles published per country and the average number of citations per article. **Table 1** lists the top 10 cited articles in descending order, and the citation number ranged from 794 to 1,636.

Distribution by country, institution, and authors

All of the 1,000 publications were from 78 countries. **Table 2** shows detailed information on the top 10 countries. The USA had the most publications (519 publications), followed by France (131 publications) and Australia (127 publications). The USA has been the most remarkable in the past decade, indicating its overwhelming impact not only on HC research but also on medical science research, which may relate to the abundant resources and higher GDP [23].

We created a visualization map of HC research articles using VOSviewer to assess worldwide cooperation. Collaborations between countries, institutions, and authors are depicted in **Figure 3**. Nodes with high co-occurrence are stained in the same color, and similar colors form one cluster, indicating closer partnerships. The different widths of the colored lines indicate the different scales of collaboration. The USA collaborated the most with other countries worldwide. Germany (69 collaborations) and England (67 collaborations) were the countries that collaborated the most with the USA.

The clusters were led by Johns Hopkins University (**Figure 3B**). There existed no apparent differences between institutions in international cooperation. The most productive institutions are listed in **Table 3**. The Johns Hopkins University (45 papers) ranked first, followed by Gilead Sciences Inc. (39 papers), the University of Pennsylvania, and the University of CA-San Francisco (34 papers). In addition, 7 of the top 10 institutions are located in the USA, indicating that the country has many strong research groups in this area.

Table 4 lists the most productive author. With 40 articles, Dore GJ ranked first regarding publications, and Grebely J collaborated the most with him (**Figure 3C**). Grebely J (32 articles) was followed by Mchutchison JG (24 articles). Though Lawitz E ranked 6th with 22 articles, he had the highest citation/article ratio (270.82).

Distribution by journals

All papers included in the analysis were published in 270 professional academic journals.

Table 1. The top 10 cited articles in hepatitis C research field, 2013-2022

Rank	First author	Journal	Title	No. of citations (WoSCC)	Type of articles
1	Mohd Hanafiah K	*Hepatology* 2013; 57: 1333-42.	Global epidemiology of hepatitis C virus infection: new estimates of age-specific antibody to HCV seroprevalence	1636	Review
2	Lawitz E	*N Engl J Med* 2013; 368: 1878-87.	Sofosbuvir for Previously Untreated Chronic Hepatitis C Infection	1307	Clinical Trial
3	Gower E	*J Hepatol* 2014; 61 Suppl: S45-57.	Global epidemiology and genotype distribution of the hepatitis C virus infection	1242	Review
4	Polaris Observatory HCV Collaborators	*Lancet Gastroenterol Hepatol* 2017; 2: 161-176.	Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study	1202	Review
5	Messina JP	*Hepatology* 2015; 61: 77-87.	Global Distribution and Prevalence of Hepatitis C Virus Genotypes	1016	Comparative Study
6	European Association for Study of Liver	*J Hepatol* 2015; 63: 199-236.	EASL Recommendations on Treatment of Hepatitis C 2015	991	Guideline
7	European Association for the Study of the Liver	*J Hepatol* 2018; 69: 461-511.	EASL Recommendations on Treatment of Hepatitis C 2018	973	Guideline
8	Smith DB	*Hepatology* 2014; 59: 318-27.	Expanded Classification of Hepatitis C Virus Into 7 Genotypes and 67 Subtypes: Updated Criteria and Genotype Assignment Web Resource	902	Article
9	Jacobson IM	*N Engl J Med* 2013; 368: 1867-77.	Sofosbuvir for Hepatitis C Genotype 2 or 3 in Patients without Treatment Options	838	Clinical Trial
10	AASLD/IDSA HCV Guidance Panel	*Hepatology* 2015; 62: 932-954.	Hepatitis C guidance: AASLD-IDSA recommendations for testing, managing, and treating adults infected with hepatitis C virus	794	Review

Table 2. The top 10 most productive countries among the top 1000 articles on hepatitis C research

Rank	Country	No. of articles	No. of citations	Citations per article
1	USA	519	62378	120.19
2	France	131	15813	120.71
3	Australia	127	11796	92.88
4	England	124	13778	111.11
5	Germany	117	12219	104.44
6	Canada	104	11092	106.65
7	Italy	89	8854	99.48
8	China	86	5665	65.87
9	Spain	68	8151	119.87
10	Japan	64	4710	73.59

The number of papers published in the top 10 journals varied between 19 and 109, accounting for 43.2% (**Table 5**). Among these journals, Hepatology contributed the highest number of publications (109 publications, IF 2021 = 17.298) and was the most frequently cited journal. The Journal of Hepatology (76 publications, IF 2021 = 30.083) was followed by Clinical Infectious Diseases (60 publications, IF 2021 = 20.999). The Lancet had the highest IF (202.731), and its citation/article ratio (253.89) was more than that of other listed journals.

Analysis of keywords

Based on the time zone, **Figure 4** shows the HC research trend. The nodes move from left to right, showing the different topics that researchers tend to focus on in each period. Additionally, the size of each node reflects researchers' interests in a given topic. In 2013, topics such as virus infection, sustained virologic response, therapy, ribavirin, hepatocellular carcinoma, and cirrhosis were more visible. In 2014, researchers focused more on epidemiology and genotype. Evidently, the research trend in 2015 shows that researchers have focused on direct-acting antiviral agents (DAA) such as sofosbuvir. In 2016, the studies on ledipasvir received considerable attention from researchers. The research in 2017 suggested that topics like therapy in people who inject drugs (PWID), velpatasvir, sofosbuvir plus ribavirin, safety, and efficacy, have received more attention than others. Treatment was still trending in 2018, with pibrentasvir and daclatasvir plus sofosbuvir receiving more attention. Meanwhile, HC and HIV co-infection has also been widely discussed. In 2019, virus, prevention, and HCC were more visible. In 2020, intervention and PWID remained widely discussed. In the last year of the Global health sector strategy on viral hepatitis 2016-2021, HCV clearance and HC elimination were paid increased attention. Presently, in 2022, more efforts are needed to access the goal of eliminating HC infections by 2030.

Figure 5 shows the top 20 keywords with the strongest citation burst. The citation burst, which demonstrated a sharp rise in occurrence over a certain period, referred to frontier disciplines and dynamic changes in a particular field. Frontier topics were represented by keywords whose occurrence burst lasts until 2022. The most recent burst keywords were "care" (2018-2022), "virus" (2019-2022), "intervention" (2019-2022), "HCV" (2020-2022), "HIV" (2020-2022), and "risk" (2020-2022).

Analysis of research areas and references

Table 6 presents the subject areas of study regarding HC. Over 37% of the studies were conducted in the Gastroenterology & Hepatology area. Furthermore, the research areas of General Internal Medicine (10%) & Immunology, Infectious Diseases, and Microbiology (7.8%) were also active. Researchers in these three areas published more than 50% of the studies and significantly influenced HC research development.

In bibliometric research, reference analysis is an important indication. The pieces of literature with the strongest citation burst are considered the knowledge fundamentals of the research frontiers [24, 25]. The top 10 references with the strongest citation bursts are listed in **Table 7**. The most recent burst references were "Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study" [26] and "EASL Recommendations on Treatment of Hepatitis C 2018" [27]. They both remained active till now (2019-2022).

Discussion

Considering the top 1,000 cited papers concerning HC, the USA is undoubtedly the leading driving force, with most publications. Furthermore, 7 of the top 10 institutions are from the USA, showing its overwhelming strength. HCV is

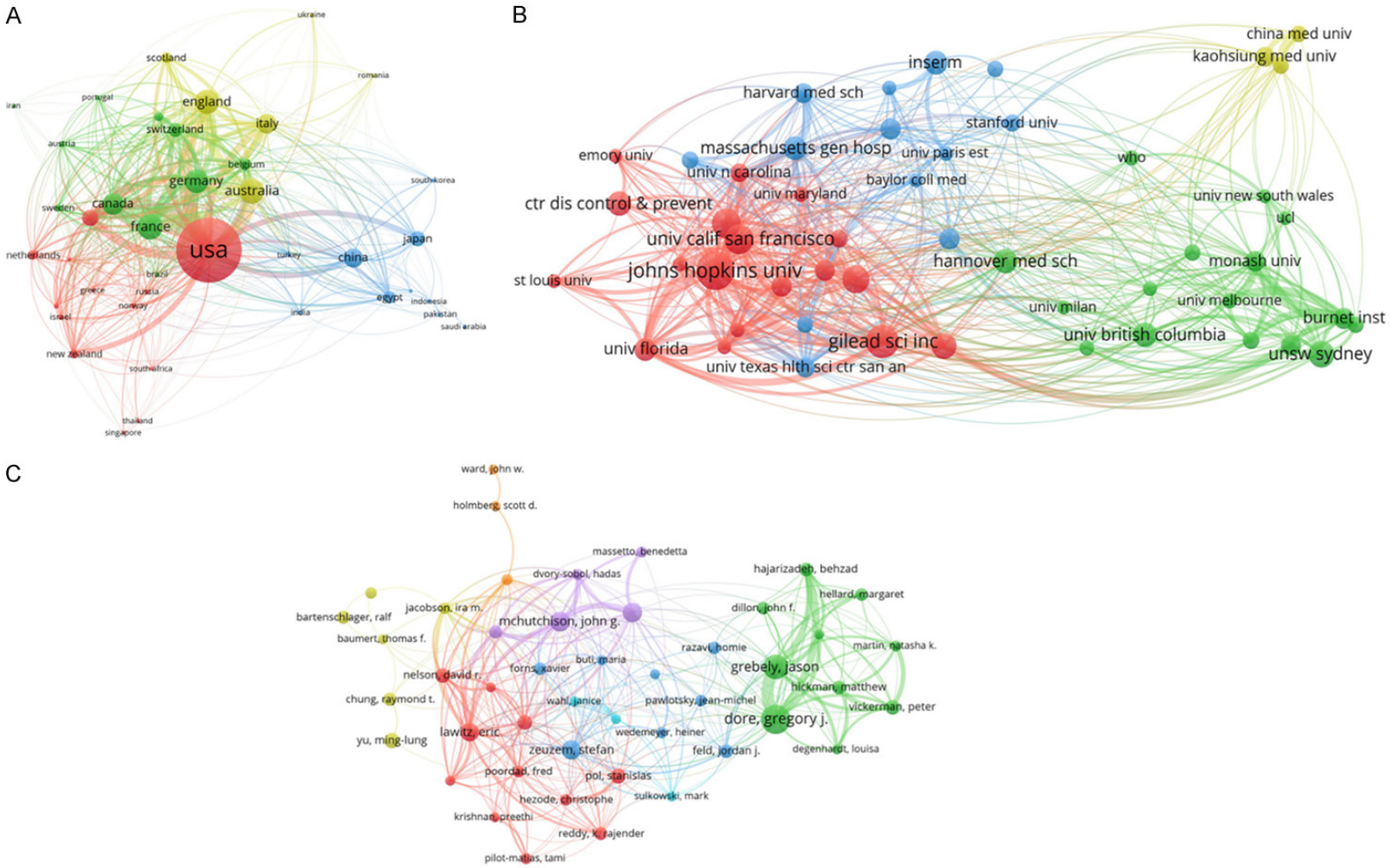

Figure 3. Scientific influence of hepatitis C research worldwide. A. Influential countries. B. Influential institutions. C. Influential authors.

Table 3. The top 10 most productive institutions among the top 1000 articles on hepatitis C research

Rank	Institutions	No. of articles	No. of citations	Country
1	Johns Hopkins University	45	7475	USA
2	Gilead Sciences Inc	39	7317	USA
3	University of Pennsylvania	34	5487	USA
4	University of CA-San Francisco	34	3741	USA
5	University of Washington	32	4731	USA
6	University of New South Wales	30	1573	Australia
7	University of California San Diego	29	4270	USA
8	Centers for Disease Control and Prevention	28	6276	USA
9	University of British Columbia	28	3717	Canada
10	Hannover Medical School	28	3632	Germany

Table 4. The top 10 most productive authors among the top 1000 articles on hepatitis C research

Rank	Author	No. of articles	Total citations	Citations per article
1	Dore GJ	40	4022	100.55
2	Grebely J	32	3049	95.28
3	Mchutchison JG	24	5417	225.71
4	Zeuzem S	23	3362	146.17
5	Brainard DM	23	1894	82.35
6	Lawitz E	22	5958	270.82
7	Pol S	17	2387	140.41
8	Yu ML	17	710	41.76
9	Nelson DR	16	3847	240.44
10	Sulkowski MS	16	3825	239.06

the most common bloodborne pathogen in the USA, chronically affecting approximately 2.4 million Americans [28, 29]. However, most people often being asymptomatic for a long time and have not been tested for HCV, are unaware of the infection. Therefore, HCV eradication stands as a national goal. Although HC is no longer the leading cause of liver transplants in the USA [30], it remains the most dominant contributor to liver cancer mortality despite new antiviral therapies [31]. Contrarily, being the country with one of the most HCV-infected patients, China, the only developing country on the list, accounts for more than 14% of the worldwide HC prevalence [32]. In addition to the widespread lack of HC awareness, China has experienced a low rate of treatment uptake. Reportedly, about one-fifth of all yearly deaths from HC-related cirrhosis and HCC occur in China [33]. Therefore, to reduce the growing HC burden and achieve WHO's targets by 2030 [15], China has conducted numerous studies to overcome the current challenges of eliminating HC. However, China still has a long way to go in terms of both quantity and quality.

Topics such as virus infection, sustained virologic response, therapy, ribavirin, hepatocellular carcinoma, and cirrhosis were more visible in 2013. This year, to inform public health decision-makers, Mohd Hanafiah K conducted a study that collected and analyzed prevalence data for estimating the HC burden [34]. This study has been cited widely and ranked 1st among the top 1,000 papers. The primary goal of treating HC is to achieve sustained virologic response (SVR); the development of DAA drugs has revolutionized the treatment of HC patients and has become the current standard. In 2013, a clinical trial published by Lawitz Eric et al. ranked 2nd among the top 10 articles [35]. This study tested the SVR rate of sofosbuvir for previously untreated HCV GT1, 4, 5, or 6 and found adverse events with sofosbuvir were less frequent than with peginterferon. In 2014, researchers focused more on epidemiology and genotype. Gower E et al. reported global epidemiology and genotype distribution of HCV [3]. Further, Polaris Observatory HCV Collaborators published a modeling study of the global prevalence and genotype distribution

Table 5. The top 10 most productive journals among the top 1000 articles on hepatitis C research

Rank	Journal	No. of articles	Total citations	Impact Factor (IF 2021)	Citations per article	Web of Science category
1	Hepatology	109	16153	17.298	148.19	Gastroenterology & Hepatology
2	Journal of Hepatology	76	11987	30.083	157.72	Gastroenterology & Hepatology
3	Clinical Infectious Diseases	60	4743	20.999	79.05	Immunology; Infectious Diseases; Microbiology
4	Gastroenterology	39	5194	33.883	133.18	Gastroenterology & Hepatology
5	Journal of Viral Hepatitis	32	1748	3.517	54.63	Gastroenterology & Hepatology; Infectious Diseases; Virology
6	Annals of Internal Medicine	28	5622	51.598	200.79	Medicine, General & Internal
7	Liver International	27	1592	8.754	58.96	Gastroenterology & Hepatology
8	Lancet Gastroenterology & Hepatology	22	2240	45.042	101.82	Gastroenterology & Hepatology
9	Alimentary Pharmacology & Therapeutics	20	1501	9.524	75.05	Gastroenterology & Hepatology; Pharmacology & Pharmacy
10	Lancet	19	4824	202.731	253.89	Medicine, General & Internal

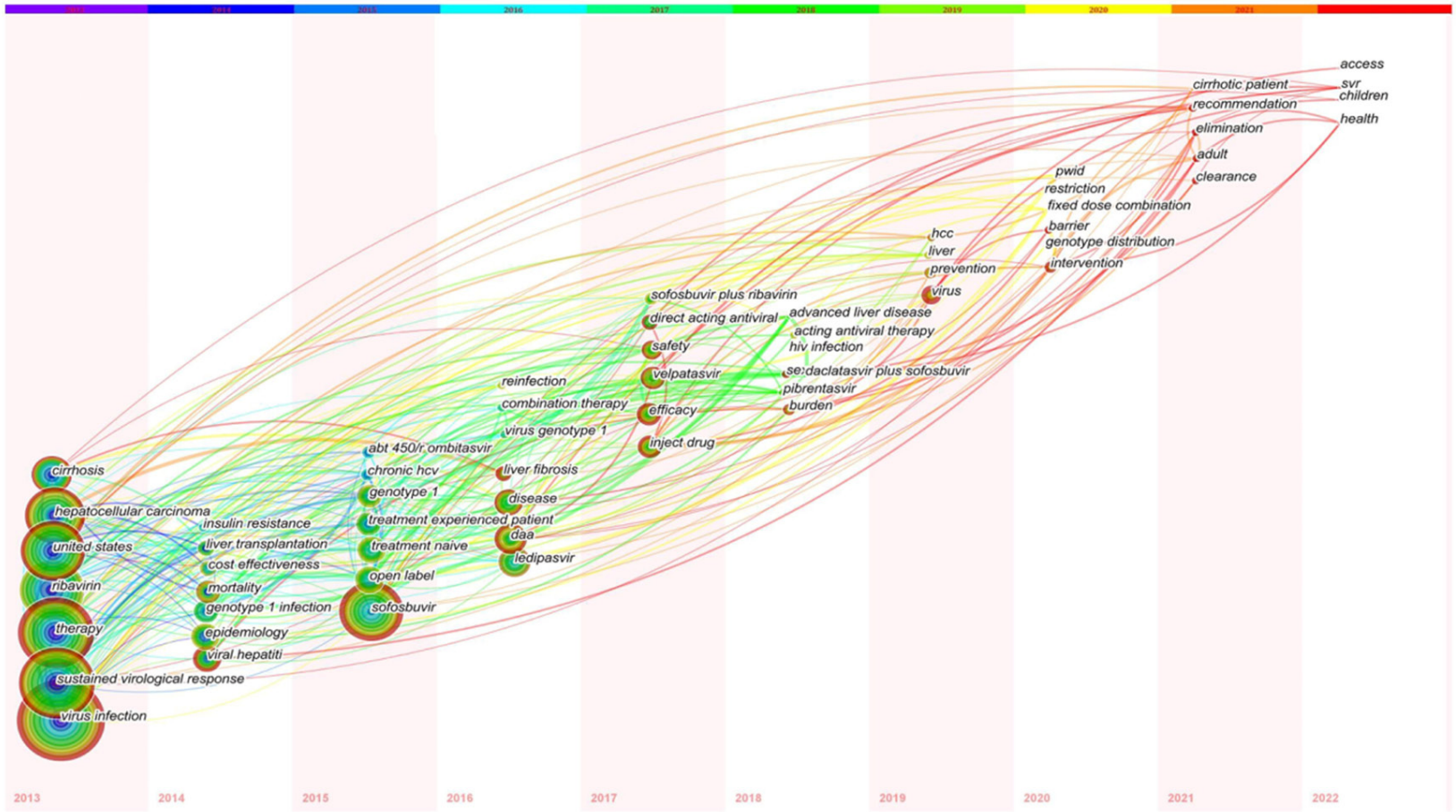

Figure 4. The time zone visualization map of co-occurring keywords in hepatitis C research.

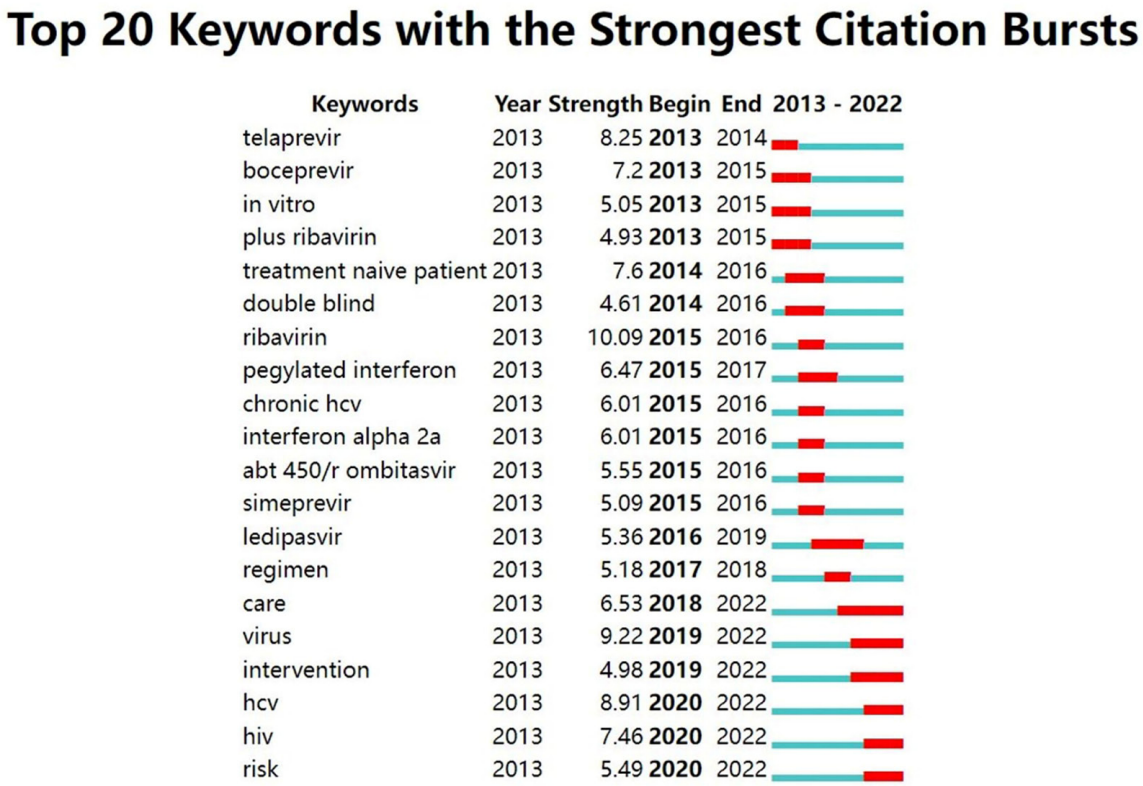

Figure 5. Keywords with the strongest citation burst on hepatitis C research.

Table 6. Active research areas in hepatitis C research

Rank	Research Areas	Count
1	Gastroenterology & Hepatology	372 (37.20%)
2	General & Internal Medicine	100 (10.00%)
3	Immunology; Infectious Diseases; Microbiology	78 (7.80%)
4	Science & Technology - Other Topics	52 (5.20%)
5	Gastroenterology & Hepatology; Infectious Diseases; Virology	32 (3.20%)
6	Virology	25 (2.50%)
7	Gastroenterology & Hepatology; Pharmacology & Pharmacy	20 (2.00%)
8	Substance Abuse	19 (1.90%)
9	Infectious Diseases	19 (1.90%)
10	Pharmacology & Pharmacy	14 (1.40%)

[26] as the most recent reference with the strongest citation bursts that have been widely cited and co-cited. Both papers have become a cornerstone of related research.

In 2015 and 2016, studies on DAA, such as sofosbuvir and ledipasvir, received considerable attention from researchers. Combination regimens of DAA agents targeting different viral proteins are often used to halt viral replication. A fixed-dose combination (FDC) tablet consisting of sofosbuvir, velpatasvir, and voxilaprevir was the first triple-DAA FDC approved in the US and EU [36]. Later research found that sofosbuvir/velpatasvir/voxilaprevir is an essential and practical option for treating HCV GT1-6 infection in adults, particularly those who have previously failed DAA treatment with or without an HCV NS5A inhibitor [36]. Several excellent open-label trials assessed the effectiveness of sofosbuvir and ledipasvir combination in treating HC in different conditions. Although limited data on the natural history of HCV GT5 infection is available, some evidence shows that

Table 7. Top 10 References with the Strongest Citation Bursts

Rank	References	Year	Strength	Begin	End	2013-2022
1	Jacobson IM, et al. Telaprevir for previously untreated chronic hepatitis C virus infection. *N Engl J Med*. doi:10.1056/NEJMoa1012912	2011	19.95	2013	2014	
2	Poordad F, et al. Boceprevir for untreated chronic HCV genotype 1 infection. *N Engl J Med*. doi:10.1056/NEJMoa1010494	2011	19.46	2013	2014	
3	Ghany, Marc G et al. "Diagnosis, management, and treatment of hepatitis C: an update". *Hepatology* (Baltimore, Md.). doi:10.1002/hep.22759	2009	16.87	2013	2014	
4	Zeuzem, Stefan et al. "Telaprevir for retreatment of HCV infection". *N Engl J Med*. doi:10.1056/NEJMoa1013086	2011	14.14	2013	2014	
5	Lawitz E, et al. Sofosbuvir for previously untreated chronic hepatitis C infection. *N Engl J Med*. doi:10.1056/NEJMoa1214853	2013	16.96	2015	2016	
6	Poordad F, et al. ABT-450/r-ombitasvir and dasabuvir with ribavirin for hepatitis C with cirrhosis. *N Engl J Med*. doi:10.1056/NEJMoa1402869	2014	14.88	2015	2017	
7	Lawitz E, et al. Simeprevir plus sofosbuvir, with or without ribavirin, to treat chronic infection with hepatitis C virus genotype 1 in non-responders to pegylated interferon and ribavirin and treatment-naive patients: the COSMOS randomised study [published correction appears in Lancet. 2014 Nov 15;384(9956):1748]. *Lancet*. doi:10.1016/S0140-6736(14)61036-9	2014	13.9	2015	2017	
8	European Association for Study of Liver. EASL Recommendations on Treatment of Hepatitis C 2015. *J Hepatol.* doi:10.1016/j.jhep.2015.03.025	2015	17.39	2016	2017	
9	Polaris Observatory HCV Collaborators. Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study. *Lancet Gastroenterol Hepatol*. doi:10.1016/S2468-1253(16)30181-9	2017	18.02	2019	2022	
10	European Association for the Study of the Liver. Electronic address: easloffice@easloffice.eu; European Association for the Study of the Liver. EASL Recommendations on Treatment of Hepatitis C 2018. J Hepatol. doi:10.1016/j.jhep.2018.03.026	2018	17.48	2019	2022	

patients with GT5 are usually older than those with other genotypes and often have high viral loads and cirrhosis [37, 38]. A multicenter study showed that ledipasvir-sofosbuvir's oral regimen is an effective and well-tolerated treatment both in treatment-naive or treatment-experienced patients with HCV GT5 infection [39]. The shortcoming of this trial was the small number of patients included. However, this all-oral ribavirin-free regimen may represent a significant advance in treating GT5 in HC, and is therefore, yet to be confirmed in more extensive trials. A randomized study found that ledipasvir-sofosbuvir combined with ribavirin had a higher SVR rate after 12 weeks of treatment in patients with advanced liver disease (including those with decompensated cirrhosis before and after liver transplantation) [40]. Thus, this became an effective and valuable treatment option for patients with GT1 or 4 and advanced liver disease.

Many DAAs are not recommended for use in patients with severe renal insufficiency because clearance of these drugs occurs primarily in the kidneys, limiting treatment options for severe renal impairment and HC. A study published in The Lancet Gastroenterology & Hepatology assessed sofosbuvir and ledipasvir to treat chronic GT1 HCV infection among severe kidney diseases [41] and was shown to be safe and effective in patients with stage 4-5 chronic kidney disease. Presently, the feasibility of DAAs therapy for liver transplant recipients is well-established; however, specific experience with new HC therapies after renal transplant is limited. More trials are necessary to evaluate the benefits of multiple new therapies in renal transplant patients and build more clinical decision-making experience.

Research topics such as therapy in people who inject drugs (PWID) attracted widespread attention in 2017. In 2018 the term treatment was still trending, and Pibrentasvir and daclatasvir plus sofosbuvir received more attention. A published recommendation on the HC treatment [27] gained extensive attention. As the reference with the strongest citation burst recently, exploring the knowledge base at the research forefront is potentially valuable. Meanwhile, HC and HIV co-infection has also been widely discussed. In 2019, the topic of prevention and HCC became more visible. Intervention and PWID remained extensively discussed in 2020. In the last year of the Global health sector strategy on viral hepatitis 2016-2021, HCV clearance and HC elimination were given greater attention. At present, in 2022, more efforts are needed to reach the goal of eliminating HC infections by 2030. More clinical randomized open-label trials should also be conducted to assess the virologic failure or post-treatment resistance of different regimens and their safety. Efficient, short-course, and simple DAA regimens can improve patient adherence and reduce the burden of medical and diagnostic procedures, thereby increasing the treatment accessibility. However, with the rapid availability of new regimens and the multiple factors to consider, the complexity of treatment selection has also increased. Future research on multiple regimens may further address the treatment needs of some difficult-to-treat subgroups or special populations and potentially streamline treatment recommendations.

To the best of our knowledge, this study is the first bibliometric analysis of HC research in the past decade; however, it has some limitations. First, the data was retrieved solely from the WoSCC database due to its reputable source of publications and citations, limiting all possible articles and the number of documents included in the analysis. Second, the search strategy might also be insufficient because we searched these articles only using "hepatitis C", which may have led to a lack of articles due to other terminology. Additionally, we conducted a selected data analysis that may have ignored some specific essential points and details. As all the above reasons may lead to bias in the results, the interpretation of the results should be cautious.

Conclusion

This study provides a new inspiration for scientific research in the HC field. It showed that treatment was the most influential aspect of HC research, and more reports about clinical studies of new regimens may exist. Future research may focus more on HCV and HIV co-infection, treatment, and elimination of HC.

Disclosure of conflict of interest

None.

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