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A decade of SGLT2 inhibitors in cardiovascular science: a bibliometric review

Ahmet Yılmaz
Department of Cardiology, Faculty of Medicine, Karamanoğlu Mehmetbey University, Karaman, Turkiye

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ABSTRACT

Aims: Sodium-glucose cotransporter 2 (SGLT2) inhibitors have gained significant attention in cardiovascular science due to their cardioprotective and Reno protective effects beyond glucose control. Over the past decade, research in this field has expanded rapidly. This study aims to conduct a bibliometric analysis of global research trends on SGLT2 inhibitors in cardiovascular diseases from 2014 to 2024, evaluating publication output, citation impact, influential contributors, keyword trends, and international collaboration networks.

Methods: A bibliometric analysis was performed using the Web of Science (WoS) Core Collection database, focusing on articles published between January 1, 2014, and December 31, 2024, within the "cardiac cardiovascular system" category. VOSviewer software was utilized to visualize author collaborations, institutional affiliations, keyword co-occurrence, and citation distributions.

Results: A total of 1,271 articles were analyzed. Research output has increased significantly, particularly after 2020, aligning with key clinical trials on SGLT2 inhibitors. The most prolific journals included Cardiovascular Diabetology, Journal of the American College of Cardiology, and European Journal of Heart Failure. Leading institutions such as Harvard Medical School, University of Toronto, and University of Groningen were identified as major contributors. Citation analysis highlighted high-impact studies on SGLT2 inhibitors' cardiovascular and renal benefits. Keyword co-occurrence analysis showed that heart failure, diabetes mellitus, and renal protection were dominant themes. The United States, Germany, and China emerged as major players in global collaborations, shaping the research landscape.

Conclusion: The bibliometric findings suggest that research on SGLT2 inhibitors in cardiovascular diseases is rapidly evolving, with increasing global contributions and high-impact publications shaping clinical applications. Future studies should focus on long-term cardiovascular and renal outcomes, mechanistic insights, and comparative effectiveness research to further establish SGLT2 inhibitors' role in cardiovascular medicine.

Keywords: SGLT2 inhibitors, cardiovascular diseases, heart failure, bibliometric analysis, citation impact

INTRODUCTION

Cardiovascular diseases (CVDs) continue to be the most common disease today, especially in people with diabetes and chronic kidney disease (CKD).[1] The relationships between these conditions are understood because processes of metabolism and hemodynamics are recognized as risk factors for the development of cardiovascular events.[2]

Sodium-glucose cotransporter 2 (SGLT2) inhibitors represent a new pharmacological class that goes beyond glucose control to include cardiovascular and renal protection.[3] Landmark trials like EMPA-REG OUTCOME study first showed the clear evidence of the cardiovascular protective effect of SGLT2 inhibitors by documenting the reduction of cardiovascular death and hospital admissions for heart failure.[4] These outcomes were confirmed in subsequent meta-analyses and systematic reviews that reported a reduction in major adverse cardiac events (MACE) and the preservation of renal functions in various populations.[5,6]

With the development of new literature, the role of SGLT2 inhibitors in cardiovascular diseases is gaining attention, as a bibliometric analysis already provides an overview of some key contributors and research focus changes in this area.[7] Some studies have defined important and leading publications of interest along with the increase in international attention towards this area of research.[8] There is no existing literature that provides a detailed bibliometric examination concerning the scope of SGLT2 inhibitor research in the field of cardiovascular medicine.

This study will help fill this gap by performing a bibliometric study of all literature published on SGLT2 inhibitors and cardiovascular diseases within the time frame of January 1,

Corresponding Author: Ahmet Yılmaz, dr.ahmetyilmaz@gmail.com

2014, to December 31, 2024, using WoS. In particular, this analysis intends to:

- Evaluate temporal trends in research output and citation dynamics.
- Identify key contributors, institutions, and influential journals in this field.
- Assess the impact of high-citation studies and emerging research themes.
- Explore keyword co-occurrence networks and research clusters.
- Examine global collaboration networks and institutional affiliations.

By systematically mapping the academic landscape of SGLT2 inhibitors in cardiovascular diseases, this study aims to provide valuable insights for researchers, clinicians, and policymakers interested in the future directions of this evolving therapeutic area.

METHODS

Ethical Considerations

Since this research is a bibliometric study, it did not require ethics committee approval. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Data Collection

Data for this bibliometric analysis were obtained from the Web of Science (WoS) core collection, a widely used database containing high-quality, peer-reviewed scientific publications. The study focused on the topic of "SGLT2 inhibitors" within the field of "cardiac cardiovascular system" and examined studies published between January 1, 2014, and December 31, 2024. The search query applied the keyword "SGLT2 inhibitors" with the "topic" filter and restricted the results to the "cardiac cardiovascular system" category in WoS categories.

As a result of the initial search, 1271 articles were identified. The titles, abstracts, and keywords of the articles were carefully reviewed, and duplicate records were removed. Only peer-reviewed articles that met the inclusion criteria were selected for analysis. The first 10 articles were independently reviewed by two researchers, and disagreements regarding selection were resolved through discussion and consensus.

Data collection was conducted between January and March 2024. For each article, the following bibliometric information was extracted:

- Article title
- Author names
- Publication year
- Journal name
- Journal impact factor
- Citation counts
- Country of affiliation of authors
- Institution names
- Frequently used keywords

The extracted data were verified by two independent observers, and inconsistencies were resolved through consensus.

Bibliometric Analysis

Bibliometric analysis was performed using VOSviewer (version 1.6.11, Leiden University, The Netherlands) to visualize research trends, keyword relationships, and collaboration networks. The primary areas of focus in the analysis included:

- **Annual publication trends:** Examination of publication growth over time.
- **Journal-specific publication trends:** Identification of the most frequently publishing journals in the field.
- **Citation analysis:** Assessment of highly cited authors, articles, journals, and publication years.
- **Keyword co-occurrence analysis:** Identification of commonly used terms and thematic clusters.
- **Institutional affiliations and inter-institutional collaborations:** Mapping research contributions by different institutions.
- **Country-level collaboration networks:** Visualization of international research collaborations.
- **Author collaboration networks:** Analysis of research partnerships among authors.

Statistical Analysis

Descriptive statistics (frequencies and percentages) were used to summarize publication numbers, citation distributions, and journal impact measures. Temporal trends in article output were analyzed to assess changes in research activity over time. Keyword co-occurrence networks were generated to reveal thematic clusters and conceptual relationships in the field.

Inter-institutional and international collaboration patterns were visualized using bibliometric mapping techniques. The density of collaborations was represented by the thickness of the connection lines, revealing common research focuses across institutions and countries. Cluster coefficients and connection densities were calculated to measure the integrity and integration of research themes within the bibliometric landscape.

RESULTS

Analysis of the Temporal Distribution of Scientific Publications on SGLT2 Inhibitors

Figure 1 presents the annual distribution of studies obtained from the Web of Science dataset.

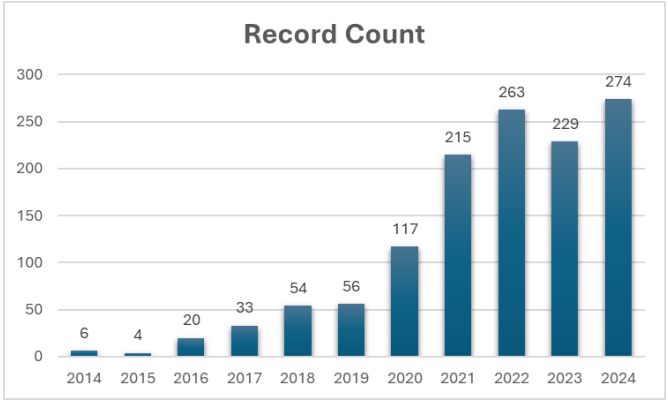

Figure 1. Annual distribution of publications on SGLT2 inhibitors

Based on the analysis conducted using Web of Science data, the distribution of studies on "SGLT2 inhibitors" within the "cardiac cardiovascular system" field from 2014 to 2024 is presented below;

In 2014, only six studies were published, and this number decreased to four in 2015. Starting in 2016, a gradual increase in the number of studies was observed, reaching 54 in 2018 and 56 in 2019. A significant rise occurred in 2020, with 117 studies published, followed by 215 studies in 2021 and 263 in 2022. In 2023, the number of studies reached 229, and in 2024, it peaked at 274 publications, marking the highest number of studies within the analysis period.

Overall, these data indicate a remarkable increase in scientific research on SGLT2 inhibitors in the field of "cardiac cardiovascular system" in recent years. This trend highlights the growing significance of SGLT2 inhibitors in cardiovascular health and the increasing academic interest in this topic.

Journals with the Highest Number of Publications on the Topic

The distribution of journals that have published the most studies on "SGLT2 inhibitors" within the field of "Cardiac Cardiovascular System" in the Web of Science database is presented in Table 1.

Table 1. Distribution of journals by number of publications and percentage

Publication titles	Record count	% of 1271
Cardiovascular Diabetology	135	10.622%
Journal of the American College of Cardiology	82	6.452%
European Journal of Heart Failure	76	5.980%
European Heart Journal	70	5.507%
Circulation	53	4.170%
Frontiers in Cardiovascular Medicine	52	4.091%
Esc Heart Failure	43	3.383%
Heart Failure Reviews	40	3.147%
Cardiovascular Drugs and Therapy	35	2.754%
Jacc Heart Failure	34	2.675%
Others	651	51.219%

According to Table 1, research on SGLT2 inhibitors in the cardiac cardiovascular system field is concentrated in specific journals. Cardiovascular Diabetology leads with 135 publications (10.62%), followed by the Journal of the American College of Cardiology (82, 6.45%), European Journal of Heart Failure (76, 5.98%), and European Heart Journal (70, 5.50%).

Other notable journals include Circulation (53, 4.17%), Frontiers in Cardiovascular Medicine (52, 4.09%), ESC Heart Failure (43, 3.38%), Heart Failure Reviews (40, 3.15%), Cardiovascular Drugs and Therapy (35, 2.75%), and JACC Heart Failure (34, 2.67%).

Additionally, 651 articles (51.22%) appeared in various other journals, reflecting the broad academic scope of this research. However, Cardiovascular Diabetology, Journal of the American College of Cardiology, and European Journal of Heart Failure emerge as key contributors, emphasizing the growing significance of SGLT2 inhibitors in cardiovascular health.

Analysis of Highly Cited Studies; Authors, Article Titles, Journals, Publication Years, and Citation Counts

Table 2 presents detailed information on these influential studies, including authors, article titles, journal names, publication years, and citation counts.

The most cited study, Heidenreich et al.,[9] published in the Journal of the American College of Cardiology, received 1261 citations. This study is a clinical practice guideline issued by the American College of Cardiology (ACC) and American Heart Association (AHA) for managing heart failure, making it a key reference in the field.

Cherney et al.[10] scrutinized the renal hemodynamic impacts of SGLT2 inhibitors on patients with type 1 diabetes and published their findings in the Circulation journal which has been cited 984 times.

Heerspink et al.[11] concentrated on the cardiovascular and renal effects of SGLT2 inhibitors, their mechanisms, and clinical usage for which they received 927 citations in Circulation.

Mcguire et al.[12] conducted an SGLT2 inhibitors meta-analysis regarding the cardiovascular and renal impacts on type 2 diabetes patients and published their findings in JAMA Cardiology, which has 732 citations.

Lopaschuk & Verma[13] shed light on the mechanistic insights of SGLT2 inhibitors on the cardiovascular system and received 533 citations in JACC; Basic to Translational Science.

Table 2. Highly cited articles on "SGLT2 inhibitors" in the "cardiac cardiovascular system" field

No	Author(s)	Article title	Journal name	Publication year	Citation count
1	Heidenreich et al.[9]	2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines	Journal of the American College of Cardiology	2022	1261
2	Cherney et al.[10]	Renal hemodynamic effect of sodium-glucose cotransporter 2 inhibition in patients with type 1 diabetes mellitus	Circulation	2014	984
3	Heerspink et al.[11]	Sodium glucose cotransporter 2 inhibitors in the treatment of diabetes mellitus: cardiovascular and kidney effects, potential mechanisms, and clinical applications	Circulation	2016	927
4	McGuire et al.[12]	Association of SGLT2 inhibitors with cardiovascular and kidney outcomes in patients with type 2 diabetes a meta-analysis	Jama Cardiology	2021	732
5	Lopaschuk GD, Verma S.[13]	Mechanisms of cardiovascular benefits of sodium glucose co-transporter 2 (SGLT2) inhibitors A state-of-the-art review	JACC-Basic to Translational Science	2020	533

These studies relate to SGLT2 inhibitors since they were the most cited ones that pertain to its focus on cardiovascular and renal mechanisms, outcomes, and even treatment guidelines. This suggests that SGLT2 inhibitors have functions apart from diabetes management such as in the prevention and treatment of cardiovascular disease. The phenomenon of increasing citation rates denotes the increasing concern and interest in the role of SGLT2 inhibitors in cardiovascular medicine.

Statistical Evaluation of Publications from the Most Cited Institutions

The institutions contributing towards research with "SGLT2 Inhibitors" within the "cardiac cardiovascular system" subfield structure of the WoS database are provided along with their corresponding publication and citation counts in the Table 3.

Table 3. Most cited institutions and number of publications according to Web of Science data

Organization	Documents	Citations
University of Toronto	57	6348
Harvard Medical School	68	4267
University of Groningen	39	2845
University of Glasgow	45	2517
Brigham and Women's Hospital	37	2292

The presentation of the data in Table 3 is the justification of the most productive institutions with regard to the "SGLT2 inhibitors" in the "cardiac cardiovascular system" field and most importantly, their publication activity "output."

As previously considered, the academic impact of the University of Toronto is unparalleled, where the 57 articles published from the university have received 6,348 citations. Following in 2nd place is Harvard Medical School with 68 publications and 4,267 citations. The University of Groningen comes in 3rd with 39 articles and 2,845 citations, signifying the importance of SGLT2 inhibitor's politics on cardiovascular science productivity.

In addition to that, the University of Glasgow has published 45 studies capturing 2,517 citations which demonstrates their impact in the field. Brigham and Women's Hospital also stands out as one of the leading institutions in this field are with 37 publications and 2,292 citations.

The latter two institutions with the highest impact are mainly medical schools and cardiovascular research centers. This suggests that SGLT2 inhibitors are gaining clinical and academic interest, and that leading research institutions are undertaking studies in this area.

Trends in the Use of Keywords in Scientific Publications

The most frequently used keywords related to "SGLT2 inhibitors" in the Web of Science database and the connections between these keywords are visualized in Figure 2.

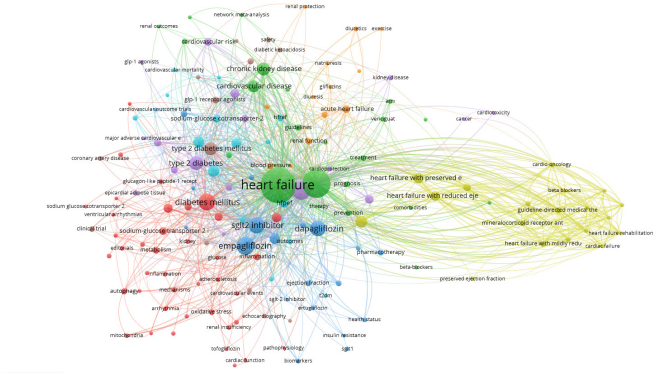

Figure 2. Co-occurring keywords and their frequency of use

The bibliometric analysis was conducted using VOSviewer software, with a minimum threshold value of 5. This threshold ensured that only keywords appearing five times or more were included in the analysis, allowing the study to focus on the most commonly used terms.

Although a total of 1,629 different keywords were identified in the analysis, only 159 keywords met the specified criteria and were included. This method aims to highlight the most prominent keywords in research on SGLT2 inhibitors and the relationships between them.

The analysis results identified the most frequently used keywords with the strongest interconnections, categorizing them into eight distinct clusters. A total of 2,021 connections were mapped, providing valuable insights into the terminology within this research field. Figure 2 visually represents the academic publications on "SGLT2 inhibitors" in the "cardiac cardiovascular system" field and highlights the most frequently used keywords, showcasing the key concepts in this area of research.

According to the documents provided, the most frequently used term is "heart failure", which is reported to have occurred 153 times. This suggests that heart failure occupies a significant portion in the literature pertaining to SGLT2 inhibitors.

The second most frequently used keyword "SGLT2 inhibitors" with 130 occurrences suggests this class of drugs is widely researched in terms of its cardiovascular impact. The words "diabetes" (105 times) and "diabetes mellitus" (80 times) indicate that SGLT2 inhibitors are mostly regarded in the context of diabetes, which is the primary focus of these studies.

Specific names of the drugs like "empagliflozin" (94 times) and "dapagliflozin" (79 times) suggest a greater interest in some SGLT2 inhibitors particular research areas, which tends to focus on the clinical effects of these drugs.

These results clearly show the overlap relevance of SGLT2 inhibitors to cardiovascular disease and diabetes. Keyword frequency is an important metric of literature research and understanding these fields. Besides, many times the same term is mentioned to help scientists comprehend the role SGLT2 inhibitors diabetes clinical and covered pharmaceutical issues.

Ultimately, his explain the relationships between SGLT2 inhibitors, cardiovasculars diseases and diabetes. Most of all, the word usage frequency tells us what issues need to be focused on when doing research.

Analysis of Institutional Collaboration Networks

SGLT2 inhibitors in the field of cardiac cardiovascular system: the network of collaborations and affiliations was explored in detail. Such exploration reveals the collaborations patterns and relationships, where the findings of the analysis are presented visually in Figure 3.

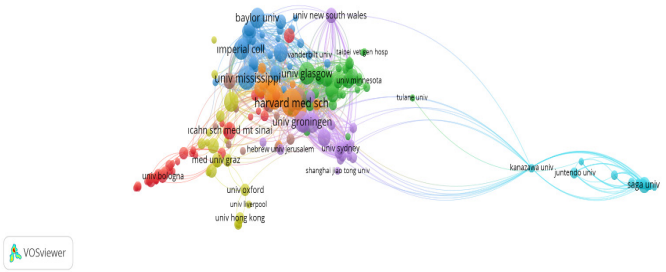

Figure 3. Bibliometric visualization of institutional scientific collaboration networks

SGLT2 inhibitors research within cardiac systems is only 1 part of the research: This work utilizes VOSviewer software. In the collaboration network analysis, colors denote thematic or regional groups, while connections are a reflection of academic partnerships. The thicker the connections, the more intense the collaborations are, and the higher the level of research activity. This visualization reveals the institutional balance of SGLT2 inhibitors research focused on the cardiac cardiovascular system, revealing existing partnerships and possibilities for future research collaborations.

The results from this analysis indicate that SGLT2 inhibitors research in the cardiac cardiovascular system is done by a few institutions. One of the most central institutions, Harvard Medical School, with 104 connections makes central institution of academic collaboration networks and is a leader in SGLT2 inhibitors research with multiple other institutions.

Likewise, University of Toronto (89 connections) and University of Groningen (86 connections) have numerous collaboration relations which are proportional to their scientific productivity. Though Brigham and Women's Hospital (82 connections) and University of Mississippi (75 connections) have comparatively lower, these are still significant academic institutions in the area who support research through institutional collaborations. University of Glasgow (73 connections) also deserves note as a highly connected university.

In any case, the analysis results suggest that the work combining SGLT2 inhibitors and the cardiovascular system is done in a particular set of universities and research institutes. These studies not only reveal a certain way in which collaboration is structured, but they also reveal a particular strategical way in which further collaboration may be useful for the achievement of goals.

Analysis of Author Collaboration Networks

The study examined published papers for the term "SGLT2 inhibitors" from Web of Science in cardiac cardiovascular system. The collaboration networks among researchers were analyzed and the participants within such networks were portrayed with results describing the academic interrelation and the growth patterns of scientific cooperation. Figure 4 depicts this Eck data visually, examining the collaboration networks further.

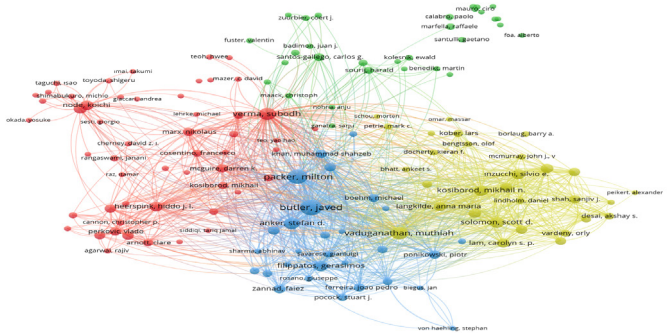

Figure 4. Academic collaboration network analysis
(Large circles represent the most influential researchers, while lines represent scientific collaborations.)

Figure 4 spell out the scores obtained with respect to the academic collaborations and bibliographic connections of those who published at least five articles about SGLT2 inhibitors within the chronicles of the cardiac cardiovascular system region. A total of 6,180 researchers were evaluated, but only 144 authors who met the specified threshold were included in the analysis. With the aim of emphasizing productive researchers, the threshold was defined to increase the value of the results.

The image above shows the collaborative networks and relationships of researchers in the scientific publications of SGLT2 inhibitors. Each author is represented as a node, where the size of the node indicates the impact of the researcher's contribution to the literature. The interconnections between the nodes show the level of interactions and partnerships made within the field; closer the nodes are, the stronger the partnerships are. Different colors indicate clusters of researchers who work on similar topics or methodologies.

The red cluster shows high interconnections with other authors. A web of authors has formed strong connections among themselves. Writers of this cluster include but are not limited to Verma Subodh and Heerspink Hiddo[11] who are emerging leaders in this group, which allows ample subordination.

The green cluster has less degree of interconnections than the other clusters. Santos Gallego and Sourij Harald are central figures in this cluster. Others have observed that there is a lower assortment of scattered connections within these two names making it a more regional or central themed collaboration.

The blue cluster has very high interaction between authors with an extensive collaboration network. The interconnections with other authors are not limited. Therefore, Butler Javed and

Packer Milton have their role in the center of this group. The figures have no restriction to these boundaries and so are free to make connections to the rest of the authors.

The Yellow Cluster is multi-centered as the first few clusters, portraying clear levels between authors. Solomon Scott D and Inzucchi Silvio E are crucial participants that are noticed of power within this cluster which paves way for them to make cross section connections with others.

The scholars in specific interaction fields are represented as a colorized network of authors which depicts their academic relationships. This type of analysis focuses on the individual, collaborative networks as well as the strengths of interconnections.

Analysis of Citation Distribution Among Countries

Citations of publications on "SGLT2 inhibitors" under the specialty "cardiac cardiovascular system" were examined in terms of their coverage by a particular country through Web of Science (WoS). The results of this analysis, which attempts to show on the map the geographical distribution, regional concentrations, and international scientific collaboration of citations, are presented in Figure 5. This research demonstrates how the literature on SGLT2 inhibitors is constructed globally and helps in the analysis of academic contribution flows per country.

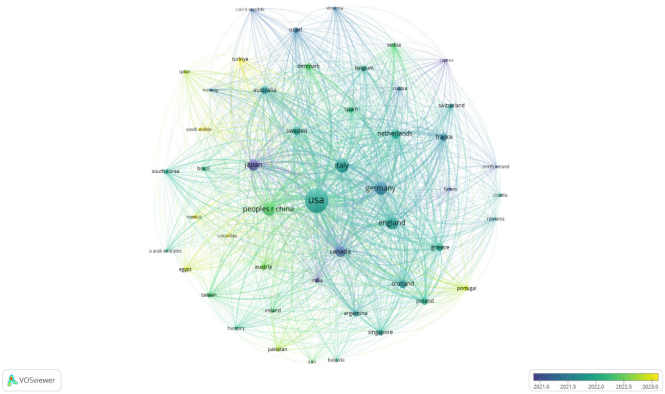

Figure 5. Country-based citation density

This figure determines the collaborations and citation distribution of member countries as regards to the SGLT2 inhibitors guidelined by the scholarly publications databased in WoS. Only countries with at least five published articles were included in the evaluation, which ultimately narrowed the participants for comparison down to 49 out of the total 86. The analysis revealed five major clusters of countries which represent the primary collaboration focus areas for SGLT2 inhibitors research. These results explain the flow of science and innovations between countries and allow for evaluating global SGLT2 inhibitors research activities.

The map shows where the SGLT2 inhibitors have defined the global network of citations, as well as the geographical distributions of collaborations. In the figure, the lines represent collaborative effort intensity between nations, whereas the circles represent literature contribution quantiles per country.

If circles define the nodes in the system of the International Scientific Citations Index, the United States (USA) stands out clearly as the major node. The USA also works closely with China, the United Kingdom, Canada, Germany, Italy, and Japan which shows its persistency in other nations' scientific endeavors as well as in dominating SGLT2 inhibitors research.

Together, European nations have formed an almost complete network, which little extension is needed for Germany, United Kingdom, France, Italy and the Netherlands already have sufficiently high citation rates and strong professional relations.

Japan and China are the clear leaders in Asia. China has a very active collaboration network with the USA, while Japan has solid ties with Europe and the USA. Far behind are India, South Korea, and Taiwan, which are more prominently known for having substantial international and intra-regional associations for research.

It is noted that the USA had primary ties with Canada and Australia, who are regarded as one of the leading research hubs in their respective areas.

Sweden, Switzerland, Spain, Israel, and Portugal have few connections, which allows them to contribute at a local level deepening the diversity of the literature in this particular field.

This figure offers a summary of the spatial distribution of the scientific activity of the "cardiac cardiovascular system" area of study and their international cooperation. The graph epitomizes the leading countries regarding scientific output and the international structure of the academic cooperation system within this field.

DISCUSSION

Justification of findings the latest bibliometric analysis undertakes a comprehensive assessment of the research output on SGLT2 inhibitors in cardiovascular science during the last ten years. Overall, the results suggest that there is an increasing scientific productivity, citation impact, and international collaboration engagement in this area. In juxtaposing our findings with other bibliometric studies, we note at least three prominent clinical markers which define the increased focus on SGLT2 inhibitors and their use for cardiovascular protection medicine–a marked increase in research activity at the global level. The temporal analysis of research activity from 2014 to 2024 indicates a sharp increase in the number of published articles on SGLT2 inhibitors, which is noticeable from the year 2020. This rise is consistent with Pan et al.[7] who noted an increased focus on SGLT2 inhibitors in cardiology. The rise in publications follows the period of key clinical trials, like the EMPA-REG OUTCOME study, demonstrating on the significant cardiovascular related advantages of these drugs, resulting on increased interest and funding.[4]

Our research supports the work of Chen et al.,[3] who noted a rise in citations for studies with major impacts toward SGLT2 inhibitors. The citation distribution indicates that the key cardiovascular and renal studies have the greatest impact on SGLT2 inhibitors thus solidifying their importance in the management of heart failure and chronic kidney disease.[5,6]

On the institutional contributions, this analysis shows that well-known research institutions like Harvard Medical School, the University of Toronto, or the University of Groningen have been primary contributors in developing this field. This is consistent with Wang et al.,[2] who documented similar institutional structures for researchers focusing on the comorbidity of diabetes and cardiovascular disease. The high level inter-institutional cooperation noted in our study suggest that SGLT2 inhibitors are the focus of multi-center and global studies.

The co-occurrence analysis illustrated that alongside "heart failure" and "diabetes mellitus," the terms "empagliflozin" and "dapagliflozin" are also quite popular. This is the same trend as Cardoso et al.,[8] who pointed out the focus heart failure received in conjunction with SGLT2 inhibitors. At the same time, our findings are in-sync with Chen et al.[1] who have noted a developing fusion of chronic kidney disease and heart diseases in focus of research.

The emergence of research clusters related to cardioprotective mechanisms suggests a changing paradigm beyond glucose control. This is also supported by the review of Cardoso et al.[8] who presented the nonglycemic effects of SGLT2 inhibitors such as inhibition of inflammation, oxidative stress, and arterial stiffness.

According to the research contribution map, the foremost countries contributing to SGLT2 inhibitor research are the United States, Europe, and China. The US comes out on top for citations and productivity, just as Chen et al.[1] pointed out for chronic kidney disease and cardiology. European countries, especially Germany, the UK, and the Netherlands, have strong regional cooperation, as noted by Zou et al.[6] On the other hand, there has been a shift in China's position as a major research contributor that highlights the increasing focus on SGLT2 inhibitors in Asia, as discussed by Pan et al.[7] This growth of involvement suggests that these Asian economies are becoming more favorable to the clinical use and even regulatory approval of SGLT2 inhibitors.

Multiple meta-analysis have supported the assertion of the cardiovascular advantages of SGLT2 inhibitors. McGuire et al.[5] and Toyama et al.[9] showed a pronounced decline in major adverse cardiovascular events (MACE) and hospital stays due to heart failures. Our bibliometric analysis confirms them by reporting significant citation impact for those meta-analyses, meaning that they have influenced research that followed these meta-analyses.

The results of this investigation reveal the increasing importance of SGLT2 inhibitors in Cardiology. The growing activity in research and partnerships around the globe indicate that these medications will remain in the forefront of global management of cardiovascular issues, especially in people suffering from diabetes and chronic kidney disease. Further studies need to be directed toward the totality of the cardiovascular and renal implications of these inhibitors as emphasized by Barbarawi et al.[15] Other non-glucose dependent effects like anti-inflammatory and metabolic effects should be studied in greater depth as well.[16] Studies in effectiveness of SGLT2 inhibitors versus other cardioprotective drugs described by Lo et.al.,[17] will add even more clinical knowledge. As discussed, this bibliometric review helps understand the increasing interest in the utilization of SGLT2 inhibitors in cardiovascular medicine and will serve as a basis for further research, policy, and clinical action for physicians and policymakers.

Limitations

This paper sheds light on the scope of scholarly activities regarding SGLT2 inhibitors through a bibliometric lens. However, in doing so, it overlooks some other critical aspects which are as equally valuable to better understand the scholarly activity surrounding SGLT2 inhibitors. The study is primarily focused on PubMed or Scopus due to its publication focus. The analysis is also restricted to the Web of Science database which leave out important studies that exist in other sources. More inclusive work can enhance the understanding of SGLT2 inhibitors in cardiovascular science.

CONCLUSION

The analysis demonstrates that there has been an increasing tendency to publish and cite works related to SGLT2 inhibitors and their impacts in cardiovascular science in the last 10 years,. The interdisciplinary cooperation increases, the number of publications and their citations grows, and suggests a clinical relevance that exceeds glucose metabolism. Major institutions and researchers have altered the development of the field, sited keyword co-occurrence networks, and citation networks, which show focus area in heart failures, diabetes, and renal protection. There is a strong international research network that illustrates the importance of the SGLT2 inhibitors to the international community. Research should also trailer to the long-term impact on renal and cardiovascular, the biology of their cardioprotective actions and comparative effectiveness research with other agents.

ETHICAL DECLARATIONS

Ethics Committee Approval

Since this research is a bibliometric study, it did not require ethics committee approval.

Informed Consent

Since this research is a bibliometric study, it did not require informed consent.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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