Review Article

Top 100 influential articles in the field of ACE inhibitors in preventing cardiac remodeling: A bibliometric analysis

Abstract

Background: Cardiac remodeling can lead to poor outcomes like dangerous arrhythmias, ventricular dysfunction, and heart failure. Though decades of research have been conducted on cardiac remodeling and Angiotensin-converting enzymes, a comprehensive analysis using bibliometrics has yet to be performed.
Methodology: This study aimed to do a citation analysis of the hundred frequently cited articles on ACE inhibitors for the prevention of cardiac remodeling using the Scopus database. The Scopus database was searched for relevant literature by analyzing the titles, keywords, and abstracts of papers. The studies discovered were all about ACE inhibitors. The abstracts of each article were examined to determine their significance and appropriateness for the enclosure. The final selection included 100 articles, and citation analysis was performed using manual screening and Scopus.
Results: The trend of total citations increased sharply beginning in 1987, peaking around 1992, then gradually declining with occasional fluctuations until a significant uptick was seen in 2002. The articles were published between 1978 and 2022, with the highest number of articles published between 1999 and 2003. The articles originated in 24 countries, with the United States having the most representation. The articles were published in 11 different journals, with the first four accounting for more than three-quarters of the total. The top institution, with 14 articles, was Brigham and Women's Hospital. Additionally, the majority of the authors were male and of white origin. The study discovered that while the majority of authors (335/388) did not have conflicts of interest, a significant minority did, primarily among higher-ranking authors.
Conclusion: Our research aims to give a comprehensive understanding of the current studies and investigations regarding the use of Ace inhibitors in cardiovascular remodeling, in order to better inform future research efforts.

Keywords : ace inhibitors, cardiac remodelling, bibliometric analysis, heart, remodelling

Introduction

Heart failure is now understood to be a complex condition, rather than just a problem with the heart's ability to contract(1). The symptoms of HF are caused by changes in the heart's cellular and molecular components, as well as changes in the substances that help control the body's balance(2). As heart disease progresses, the heart becomes larger, its function worsens, and symptoms of heart failure become more pronounced(3). Although several terminologies have been used to describe it, cardiac remodeling comprises numerous HF-related alterations. Cardiac remodeling refers to a collection of changes that occur in the heart at the interstitial, cellular and molecular levels in response to injury(4). These changes can result in changes in the function, shape, mass, and size of the heart, leading to poor outcomes such as dangerous arrhythmias, ventricular dysfunction, and eventually heart failure(5, 6).
Although Interventions have been introduced they only address symptoms or improve blood flow, they may not effectively slow the progression of heart failure, prevent cardiac remodeling, or reduce mortality(7). However, treatment with ACE inhibitors, beta-blockers, and anti-aldosterone therapy has been shown to significantly reduce morbidity and mortality in HF(8, 9). These therapies also have the ability to slow or even reverse certain aspects of cardiac remodeling in patients with HF. Ace inhibitors are a class of medications that are commonly used to treat high blood pressure and heart failure(10, 11). They work by blocking the action of an enzyme called angiotensin-converting enzyme (ACE), which plays a key role in the regulation of blood pressure and cardiac remodeling (12). By blocking ACE and preventing the cascade of events that leads to cardiac remodeling, ACE inhibitors can help to preserve heart function and prevent the progression of heart disease.
Bibliometric analysis is a useful tool for evaluating the impact and relevance of research in a particular field(13). By analyzing the number and patterns of citations in the scientific literature, bibliometric analysis can provide insights into the areas of research that are currently most active and in demand(14, 15). This information can help guide funding decisions and inform the work of practicing physicians, who can use

bibliometric analysis to stay up-to-date with the latest research in their field. Additionally, authors can use bibliometric analysis to identify experts and collaborators in their field(16). In recent years, our understanding of the role of cardiac remodeling in heart failure and the impact of ACE inhibitors on this process has greatly improved(17). However, these studies have not been systematically analyzed. There is currently no research that performed a bibliometric analysis on this specific topic(18). By conducting an overview of this literature using bibliometric analysis, we hope to uncover valuable insights that can aid in the development of research on the impact of ACE inhibitors on cardiac remodeling and provide suggestions and inspiration for researchers working on treatments for heart failure by prevention of cardiac remodeling.

Methodology

Our preferred database is Scopus (http://www.scopus.com). According to the published comparison and analysis, compared to alternatives like Google scholar, Web of Science, and PubMed, Scopus has a wider scope of coverage when it comes to scientific articles(19, 20). In January 2023, the mentioned author conducted a search on Scopus. “Scopus filters” were used to separate clinical trials from “review articles” for the first list, which only included original articles. Similarly, studies conducted in other languages besides English, researches without abstract availability, and studies on non-human subjects, were all included for broad research. All journals found in the database were selected for the search, and no specific time period was used to include or exclude any publications. We used the terms “Heart failure”, “Congestive Heart Failure”, “chronic heart failure” “Advanced heart failure” “Myocardial Infarction”, “ventricular dysfunction”, "ventricular enlargement" and "coronary artery disease" as the main search terms. The names of specific medications were added as keywords to further broaden the keyword search. These names included “angiotensin-receptor blocker”, “angiotensin converting enzyme” “Angiotensin receptor neprilysin” and “Ace Inhibitors”. These names were derived from the classification provided in the article by Goyal (21). The ACE inhibitors and receptor blockers names included: “Enalapril”, “Captopril”, “ramipril”, “valsartan”, “losartan”, “candesartan”, “trandolapril”, “perindopril”, “zofenopril”,” lisinopril”.

The search for relevant literature on ACE inhibitors was conducted by reviewing the titles, keywords, and abstracts of articles in the Scopus database. The studies found were specifically related to ACE inhibitors. The relevance and suitability of each article for inclusion were evaluated by examining their abstracts. if it wasn't listed in Scopus, the abstract was obtained in other ways and similarly evaluated for relevance. The papers were then “combined” and ordered using the "cited by" option and the top hundred articles were selected to create the final end list. Both reviewers agreed on the relevance and inclusion of each article on the final list. The citation analysis of the top 100 rankings was performed using manual screening and Scopus. For both the interquartile ranges, mean, median, annual number of citations and a total number of citations were performed. Journal Citation Reports from Thomson Reuters were used to find the journal impact factors. Excel 2019 was used to construct the tables and graphics. The Pearson product-moment correlation test was used to examine the relationship between the number of papers published in a journal and its impact factor using IBM SPSS Statistics 26.0. A p-value of 0.05 or lower was regarded as significant.

Results

Citation Trend, count, and Citations annually

In table 1, one of the 100 most frequently cited articles regarding the use of Ace inhibitors to prevent cardio remodeling is listed. These articles received between 117 and 6650 citations, with a “median” of 219.5 and an "interquartile range" of 318.5. The combined citation count for these articles is 644,74. The total “number of citations” annually was 3052, 537. These citations ranged from 3.189 to 214.5 with a median of 9.30 and a mean of 30.52 (21.9 being the interquartile range).

As depicted in Figure 1, the course of total citations for the 100 articles in the list shows a steep increase beginning in 1987, reaching a peak around 1992. Following this, there was a gradual decline in citations each year, with occasional fluctuations, until a significant uptick was seen in 2002. From 2002 to 2020, there were minor fluctuations, but overall, the number of citations steadily decreased.

3.2 Article’s Year of Publication and their Origins

Most of the papers were published between 1978 and 2022, covering a 44-year time frame. The data shows that the peak number of articles, 29 in total, were published during the five-year interval from 1999 to 2003(figure 2).

The most cited papers in the list came from 24 different countries, with a significant percentage of the articles having authors from multiple countries. The United States had the most representation with 57 papers, followed by Canada with 31 papers and Sweden with 13 papers (fig 3).

Authors with more than five articles in the top 100 citation list

We have also searched for authors with five or more articles in the top 100 cited articles list. Table 2 shows the top 10 authors with 5 or more articles in the top 100 list of clinical trials on the effects of angiotensin-converting enzyme inhibitors (ACEIs) on survival and morbidity in patients with heart failure. The table includes the total number of articles each author has in the top 100 list, the authorship position (first, last, or other), the author's affiliation, and their h-index, which is a measure of the impact of their research. The author with the most articles in the top 100 list is J.J.V. McMurray with 10 articles. He is listed as the first or last author of 3 articles and as another author of 1 article. He is affiliated with the Glasgow Cardiovascular Research Centre in Glasgow, United Kingdom, and has an h-index of 180. McMurray, J.J.V. is the only author who authored articles in all four authorship positions, first, last, and other, and has the highest H-index of 180(Table 2).

K. Swedberg also has 10 articles in the top 100 list, with 3 articles as the first or last author and 7 as an other author. He is affiliated with Göteborgs Universitet, Department of Molecular and Clinical Medicine in Gothenburg, Sweden, and has an h-index of 131. M. Packer has 9 articles in the top 100 list, with 2 articles as the first author, 2 articles as the last author, and 5 articles as an other author. He is affiliated with Baylor Jack and Jane Hamilton Heart and Vascular Hospital in Dallas, United States, and Imperial College London in London, United Kingdom and has an h-index of 117.

S. Yusuf has 9 articles in the top 100 list, with 2 articles as the last author and 7 articles as an other author. He is affiliated with Population Health Research Institute in Ontario, Hamilton, Canada, and has an h-index of 231.

J.L. Rouleau has 8 articles in the top 100 list, with 1 article as the first author and 7 articles as an other author. He is affiliated with Institut de Cardiologie de Montreal in Montreal, Canada, and has an h-index of 116. S.D. Solomon has 7 articles in the list, with 0 as the first author, 2 as the last author, and 5 as other authors. He is affiliated with Harvard Medical School in Boston, United States, and has an H-index of 145. J.G.F. Cleland has 6 articles in the list, with 4 as the first author, 0 as the last author, and 2 as other authors. He is affiliated with the University of Glasgow in Glasgow, United Kingdom, and has an H-index of 138. Other notable authors on the list include A.S. Desai, K. Dickstein, J.N. Cohn, and B. Pitt.

Journal and Affiliations with Institutions

The 100 most-cited articles were published in 11 different journals, with the top four journals producing more than three-quarters of the articles. It can be seen in Table 3, Circulation, “Journal of the American College of Cardiology”, “New England Journal of Medicine” and Lancet have the highest number of articles in the list with 21, 15, 15, and 12 articles respectively. These journals also have high impact factors, with Circulation having an impact factor of 23.054, the Journal of the American College of Cardiology having an impact factor of 18.639, and the New England Journal of Medicine having an impact factor of 70.67. Other notable journals on the list include the Lancet, European Heart Journal, American Journal of Cardiology, European Journal of Heart Failure, Heart, Archives of Internal Medicine, British Heart Journal, and Circulation Heart Failure (Table 3).

Additionally, according to our research, several institutions have a significant number of articles in the top 100 list. The top institution is Brigham and Women's Hospital with 14 articles, followed by the University of Glasgow with 11 articles, and Institut de Cardiologie de Montreal with 11 articles. Other institutions with 6 or more articles on the list include Novartis International AG, University of California, San Francisco, Harvard Medical School, University of Montreal, National Heart and Lung Institute, VA Medical Center, Sahlgrenska Universitetssjukhuset, and University of Dundee School of Medicine. These institutions have likely made significant contributions to the field of heart failure research (Table 4).

Gender Status Of Authors

We analyzed 100 research studies on the effects of various medications, specifically ACE inhibitors, on survival and morbidity in patients with heart failure. The majority of the studies focus on enalapril and captopril, but other ACE inhibitors such as ramipril, valsartan, losartan, trandolapril, zofenopril, candesartan, perindopril, and neprilysin inhibitors are also studied. It can be seen from table(5) that the majority of the studies listed have male authors. In most cases, the first, second, third, and last authors are all male. However, there are a few studies where one or more of the authors is female. The study "Overview of Randomized Trials of Angiotensin-Converting Enzyme Inhibitors on Mortality and Morbidity in Patients With Heart Failure" has a female first author, while the study "The perindopril in elderly people

with chronic heart failure (PEP-CHF) study" has a female last author. Additionally, in the study "Development of circulatory-renal limitations to angiotensin-converting enzyme inhibitors identifies patients with severe heart failure and early mortality" all authors are female. Overall, it appears that the majority of the studies have male-dominated authorship. It is also worth noting that some studies have missing data for certain authors, as indicated by blank spaces in the "gender" column. The studies have various study designs, including randomized trials and overviews of previous studies, and have different findings on the effects of ACE inhibitors on survival and morbidity in patients with heart failure. Some studies also look at subgroups of patients, such as those with diabetes or those over 65, and the effects of ACE inhibitors on these subgroups.

From table 6, it can be seen that the majority of the authors in the studies are male. Among the first authors, 84 are male and 9 are female. Of the second authors, 74 are male and 17 are female. Of the third authors, 67 are male and 17 are female. And for the last authors, 66 are male and 10 are female. Overall, there is a higher representation of male authors in these studies. However, gender status was not known in 10 researches.

Author's Race Status

There are 100 studies conducted by different authors of various race statuses. The majority of the studies have white authors, but there are also Asian and Black authors represented (Table 7). The study "Effect of Captopril on Mortality and Morbidity in Patients with Left Ventricular Dysfunction after Myocardial Infarction has two black authors, the third and last. while the study Effect of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers on all-cause mortality, cardiovascular deaths, and cardiovascular events in patients with diabetes mellitus: A meta-analysis has all four Asian authors. There are also some authors with unique race status such as the last author of the study Acute and long-term effects of enalapril on the cardiovascular response to exercise and exercise tolerance in patients with congestive heart failure belong to race Melidossian, Caroline D. Other races represented among the last authors of the studies include Armbrecht, Juergen in the 98th study, Baker, Sharon L in the 88th study, Christ, Michael in the 83rd study, and Albanese, Elaine in the 74th study. Several studies also lack or provide insufficient information about the authors' race. It is not possible to draw additional conclusions from the data presented in this table.

According to the results, there are a total of 263 authors of white origin. Out of these, 77 are listed as first authors, 68 as second authors, 58 as third authors, and 60 as last authors (Table 8). For authors of black origin, there are 3 in total. 1 is listed as a first author, 0 as a second author, 1 as a third author, and 1 as a last author. Similarly, there are 44 authors of Asian origin, with 9 listed as first authors, 17 as second authors, 11 as third authors, and 7 as last authors. Lastly, there are 45 authors whose race is not specified in the table.

Title Funding

We found that many of the studies have funding from pharmaceutical companies, such as Bristol-Myers Squibb, Merck Sharp and Dohme, Novartis, AstraZeneca, and Hoechst. Some studies also have funding from government organizations, such as the National Heart, Lung, and Blood Institute, and the Medical Research Council of Canada, as well as non-profit organizations like the Quebec Heart Foundation and the National Heart Foundation of Australia (Table 9). Some articles also received grants from the New York State Department of Health and VHA Empire State, a grant from the National Basic Research Program of China and grant from the Zhejiang Provincial Education Department, a grant from the Scottish Office (acute health care research committee), a grant from the National Institutes of Health and Novartis Pharmaceuticals, etc.

Here is a more comprehensive detail about which articles received funding and which didn't and from which sources they received funding.

Based on the table provided, it appears that 55 articles received no funding and 42 articles received funding (Table 10). Of the articles that received funding, the majority of the funding came from pharmaceutical companies, specifically Novartis Pharmaceuticals, Merck Sharp and Dohme Research Laboratories, AstraZeneca , Hoechst, Bristol-Myers Squibb Institute for Pharmaceutical Research, Servier, E R Squibb & Sons Ltd., Roussel–Uclaf and Knoll, and King Pharmaceuticals. A small number of articles received funding from non-governmental organizations such as the National Heart Foundation of Australia, Quebec Heart Foundation, American Heart Association, National Heart Foundation of New Zealand, Deutsche Forschungsgemeinschaft, and Northwood Trust. Government funding was also provided for a small number of articles, with the National Institutes of Health, National Heart, Lung, and Blood Institute, Medical Research Council of Canada, National Health and Medical Research Council of

Australia, Canadian Institutes of Health Research, New York State Department of Health, National Basic Research Program of China, Zhejiang Provincial Education Department, acute health care research committee and Bundesministerium für Bildung und Forschung providing funding. Additionally, it is stated that 16 grants were provided but without more information, it is hard to provide more specific information about these grants.

Articles With and Without conflict of interest

One of the most important factors to consider in evaluating the credibility of a study is the potential for conflict of interest among the authors. Therefore we have analyzed the results of 100 studies on the effects of various angiotensin-converting enzyme inhibitors (ACE inhibitors) on mortality and morbidity in patients with heart failure (Table 11). The table indicates whether each author of each study has a conflict of interest, defined as any financial or professional relationship that could influence the results or interpretation of the study. Overall, the majority of the studies (90 out of 100) have no conflicts of interest among any of the authors. However, there are a few studies (10 out of 100) that have conflicts of interest among one or more authors. In these studies, the conflicts of interest are primarily related to funding from pharmaceutical companies. For example, study 8, "Valsartan, Captopril, or Both in Myocardial Infarction Complicated by Heart Failure, Left Ventricular Dysfunction, or Both" has conflicts of interest for all authors. Similarly, study 89, Baseline characteristics and treatment of patients in Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in heart failure trial (PARADIGM-HF) also have conflicts of interest for all authors.

Based on the table provided, out of the 388 authors, 335 authors had no conflict of interest and 53 authors had a conflict of interest (Table 12). Of the authors with a conflict of interest, 17 were listed as the first author, 13 were listed as the second author, 14 were listed as the third author, and 9 were listed as the last author. This suggests that the majority of authors in this study did not have any conflicts of interest, but a significant minority did have conflicts of interest, with the majority of these conflicts involving authors in higher author positions.

Discussion and conclusion

Table 1 provides a list of the 100 most-cited articles regarding the use of ACE inhibitors to prevent cardio remodeling. The total number of citations for all articles was 644,740. While the total annual “number of citations” was 3,052,537, with a median of 9.30 and a mean was 30.52. The range of annual citations was between 3.189 and 214.5, with an interquartile range of 21.9.

These results suggest that the use of ACE inhibitors to prevent cardio remodeling is a well-researched topic in the medical community that has received a substantial number of citations. The high median and mean citation count per article and per year indicate that these articles' findings have been widely recognized and cited in future work.

From the stats, it can be inferred that angiotensin-converting enzyme inhibitors (ACEIs) have had a significant impact on survival and morbidity in patients with heart failure, as evidenced by the high number of citations for the top 100 articles on this topic. The trend of citations reveals a peak around 1992, a slow decline, a significant upsurge in 2002, and infrequent fluctuations after that (fig 1). This suggests that over the past several decades, the use of ACEIs in the treatment of heart failure has been widely accepted and employed. The fact that the majority of the top 100 articles were released between 1999 and 2003 emphasizes the significance of this research at that time(22). The articles were written by authors in 24 various countries, with the United States, Canada, and Sweden having the largest representation. This suggests that there has been an international effort to study ACEIs in heart failure.

The top 100 articles' authors are highly qualified experts in their fields; many have multiple entries on the list and have high h-index scores. These articles are associated with organizations and journals that are highly regarded and influential. The majority of the authors are male and of white origin, suggesting that there isn't much diversity in the field. Additionally, a significant minority of the authors had conflicts of interest, with most of these conflicts involving authors in higher author positions. The majority of the articles received funding from pharmaceutical companies, which may raise concerns about potential bias in the research. However, a small number of articles received funding from non-governmental organizations and government funding agencies.

Strengths of the research

The major strength of this research is the use of bibliometric analysis, which is a useful tool for evaluating the impact and relevance of research in a particular field. Bibliometric analysis can provide insights into

the areas of research that are currently most active and in demand, which can aid in the development of research on the impact of ACE inhibitors on cardiac remodeling.

Limitations

This research has limitations such as relying on a literature search in the Scopus database, which may miss out on important studies on the topic and only focusing on articles that have received citations, potentially excluding significant but uncited research. Furthermore, newly published, potentially impactful articles may not yet be included in the results due to the time needed to accumulate measurable citations.

Clinical implications

Our analysis showed that the use of ACE inhibitors has a significant impact on reducing morbidity and mortality in patients with heart failure. By blocking the action of the angiotensin-converting enzyme, ACE inhibitors prevent the cascade of events that lead to cardiac remodeling and can help to preserve heart function and prevent the progression of heart disease. This information can help guide treatment decisions for physicians and inform future research in the field of heart failure and cardiac remodeling.

Table 1 Top 100 original articles, their citations, and citations per year

Rank	Article	Total Citations	Average citations per year
1	Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure	6650	214.516129
2	Effect of Captopril on Mortality and Morbidity in Patients with Left Ventricular Dysfunction after Myocardial Infarction: Results of the Survival and Ventricular Enlargement Trial	5450	181.6666667
3	Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	4692	134.0571429
4	Effect of Enalapril on Mortality and the Development of Heart Failure in Asymptomatic Patients with Reduced Left Ventricular Ejection Fractions	3497	116.5666667
5	Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE study and MICRO-HOPE substudy	3263	148.3181818
6	A randomized trial of the angiotensin-receptor blocker valsartan in chronic heart failure	2747	130.8095238
7	Effect of ramipril on mortality and morbidity of survivors of acute myocardial infarction with clinical evidence of heart failure	2342	80.75862069
8	Valsartan, Captopril, or Both in Myocardial Infarction Complicated by Heart Failure, Left Ventricular Dysfunction, or Both	2140	112.6315789
9	Effect of losartan compared with captopril on mortality in patients with symptomatic heart failure: Randomised trial - The Losartan Heart Failure Survival Study ELITE II	1793	81.5
10	Overview of Randomized Trials of Angiotensin-Converting Enzyme Inhibitors on Mortality and Morbidity in Patients With Heart Failure	1761	65.22222222
11	Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin-converting-enzyme inhibitors: The CHARM-added trial	1711	90.05263158
12	Randomised trial of losartan versus captopril in patients over 65 with heart failure (Evaluation of Losartan in the Elderly Study, ELITE)	1654	66.16
13	A clinical trial of the angiotensin-converting–enzyme inhibitor trandolapril in patients with left ventricular dysfunction after myocardial infarction	1636	60.59259259
14	Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: Results of prospectively designed overviews of randomised trials	1611	73.22727273
15	Long-term ACE-inhibitor therapy in patients with heart failure or left-	1324	60.18181818

	ventricular dysfunction: A systematic overview of data from individual patients		
16	Effects of Enalapril on Mortality in Severe Congestive Heart Failure	1173	33.51428571
17	The perindopril in elderly people with chronic heart failure (PEP-CHF) study	1138	71.125
18	The effect of the angiotensin-converting⇓enzyme inhibitor zofenopril on mortality and morbidity after anterior myocardial infarction	745	27.59259259
19	Effects of angiotensin-converting enzyme inhibition on the development of the atrial fibrillation substrate in dogs with ventricular tachypacing - Induced congestive heart failure	607	28.9047619
20	Angiotensin-neprilysin inhibition in acute decompensated heart failure	577	192.3333333
21	Angiotensin II-forming pathways in normal and failing human hearts	569	17.78125
22	Enalapril decreases the incidence of atrial fibrillation in patients with left ventricular dysfunction: Insight from the studies of left ventricular dysfunction (SOLVD) trials	510	26.84210526
23	Prognostic importance of serum sodium concentration and its modification by converting-enzyme inhibition in patients with severe chronic heart failure	487	13.52777778
24	Angiotensin receptor neprilysin inhibition compared with enalapril on the risk of clinical progression in surviving patients with heart failure	483	69
25	Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction	472	22.47619048
26	Effectiveness of Spironolactone added to an angiotensin-converting enzyme inhibitor and a loop diuretic for severe chronic congestive heart failure (The Randomized Aldactone Evaluation Study [RALES])	471	18.11538462
27	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dysfunction in patients with heart failure	471	15.7
28	Angiotensin-converting-enzyme inhibitors in stable vascular disease without left ventricular systolic dysfunction or heart failure: a combined analysis of three trials	426	26.625
29	Comparison of vasopeptidase inhibitor, omapatrilat, and lisinopril on exercise tolerance and morbidity in patients with heart failure: IMPRESS randomised trial	388	17.63636364
30	Captopril in heart failure. A double blind controlled trial	349	9.184210526
31	Effects of adding spironolactone to an angiotensin-converting enzyme inhibitor in chronic congestive heart failure secondary to coronary artery disease	309	11.44444444
32	Sustained Effectiveness of Converting-Enzyme Inhibition in Patients with Severe Congestive Heart Failure	303	7.214285714
33	Effect on survival and hospitalization of initiating treatment for chronic heart failure with bisoprolol followed by enalapril, as compared with the opposite sequence: Results of the Randomized Cardiac Insufficiency Bisoprolol Study (CIBIS) III	296	17.41176471
34	Effects of valsartan on morbidity and mortality in patients with heart failure not receiving angiotensin-converting enzyme inhibitors	294	14.7
35	Circulating plasma concentrations of angiotensin-converting enzyme 2 inmen and women with heart failure and effects of renin-angiotensin-aldosterone inhibitors	289	144.5
36	Effect of the angiotensin-receptor-neprilysin inhibitor LCZ696 compared with enalapril on mode of death in heart failure patients	288	41.14285714

37	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dilatation in patients with asymptomatic systolic dysfunction	287	9.896551724
38	Increased angiotensin-(1-7)-forming activity in failing human heart ventricles: Evidence for upregulation of the angiotensin-converting enzyme homologue ACE2	274	14.42105263
39	Early prevention of left ventricular dysfunction after myocardial infarction with angiotensin-converting-enzyme inhibition	265	8.548387097
40	Effect of propranolol versus no propranolol on total mortality plus nonfatal myocardial infarction in older patients with prior myocardial infarction, congestive heart failure, and left ventricular ejection fraction ≤40% treated with diuretics plus angiotensin-converting enzyme inhibitors	247	9.88
41	Effects of enalapril in heart failure: A double blind study of effects on exercise performance, renal function, hormones, and metabolic state	246	6.648648649
42	Immediate and sustained hemodynamic and clinical improvement in chronic heart failure by an oral angiotensin-converting enzyme inhibitor	245	5.833333333
43	Comparison of Captopril and Enalapril in Patients with Severe Chronic Heart Failure	244	6.777777778
44	Enalapril in patients with chronic heart failure: A placebo-controlled, randomized, double-blind study	240	6.315789474
45	Clinical implications of increased plasma angiotensin II despite ACE inhibitor therapy in patients with congestive heart failure	227	10.31818182
46	Counteraction of the vasodilator effects of enalapril by aspirin in severe heart failure	227	7.566666667
47	Enalapril reduces the incidence of diabetes in patients with chronic heart failure: Insight from the studies of left ventricular dysfunction (SOLVD)	226	11.89473684
48	Risk Related to Pre-Diabetes Mellitus and Diabetes Mellitus in Heart Failure with Reduced Ejection Fraction: Insights from Prospective Comparison of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure Trial	225	37.5
49	Treatment of Chronic Congestive Heart Failure with Captopril, an Oral Inhibitor of Angiotensin-Converting Enzyme	221	5.139534884
50	Aldosterone escape during angiotensin-converting enzyme inhibitor therapy in chronic heart failure	220	8.461538462
51	Contrasting peripheral short-term and long-term effects of converting enzyme inhibition in patients with congestive heart failure. A double-blind, placebo-controlled trial	219	6.636363636
52	Effect of high- versus low-dose angiotensin converting enzyme inhibition on cytokine levels in chronic heart failure	217	9.434782609
53	Determinants and clinical outcome of uptitration of ACE-inhibitors and beta-blockers in patients with heart failure: A prospective European study	215	43
54	Enalapril effects on atrial remodeling and atrial fibrillation in experimental congestive heart failure	215	10.75
55	"Escape" of aldosterone production in patients with left ventricular dysfunction treated with an angiotensin converting enzyme inhibitor: Implications for therapy	214	7.925925926
56	Systolic versus diastolic heart failure in community practice: Clinical features, outcomes, and the use of angiotensin-converting enzyme inhibitors	211	9.590909091
57	Sustained augmentation of parasympathetic tone with angiotensin-	210	7.24137931

	converting enzyme inhibition in patients with congestive heart failure		
58	Augmented short- and long-term hemodynamic and hormonal effects of an angiotensin receptor blocker added to angiotensin converting enzyme inhibitor therapy in patients with heart failure	207	9
59	Effect of sacubitril/valsartan versus enalapril on glycaemic control in patients with heart failure and diabetes: a post-hoc analysis from the PARADIGM-HF trial	200	40
60	Effect of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers on all-cause mortality, cardiovascular deaths, and cardiovascular events in patients with diabetes mellitus: A meta-analysis	199	24.875
61	Addition of angiotensin II receptor blockade to maximal angiotensin-converting enzyme inhibition improves exercise capacity in patients with severe congestive heart failure	199	8.652173913
62	Effect of enalapril on congestive heart failure treated with diuretics in elderly patients with prior myocardial infarction and normal left ventricular ejection fraction	198	6.827586207
63	Acute and long-term response to an oral converting-enzyme inhibitor, captopril, in congestive heart failure	197	4.69047619
64	Clinical outcome with enalapril in symptomatic chronic heart failure; A dose comparison	194	8.083333333
65	Angiotensin converting enzyme inhibition in patients with congestive heart failure	192	4.363636364
66	Maximally recommended doses of angiotensin-converting enzyme (ACE) inhibitors do not completely prevent ACE-mediated formation of angiotensin II in chronic heart failure	191	8.681818182
67	Long-term survival in severe heart failure in patients treated with enalapril. Ten year follow-up of CONSENSUS I	190	8.260869565
68	Abnormalities of hemorheological, endothelial, and platelet function in patients with chronic heart failure in sinus rhythm: Effects of angiotensin-converting enzyme inhibitor and β-blocker therapy	189	9
69	Comparison of the effects of losartan and enalapril on clinical status and exercise performance in patients with moderate or severe chronic heart failure	188	6.962962963
70	How often are angiotensin II and aldosterone concentrations raised during chronic ACE inhibitor treatment in cardiac failure?	185	8.043478261
71	Follow-up study of patients randomly allocated ramipril or placebo for heart failure after acute myocardial infarction: AIRE Extension (AIREX) Study	180	7.2
72	Prognostic importance of early worsening renal function after initiation of angiotensin-converting enzyme inhibitor therapy in patients with cardiac dysfunction	171	15.54545455
73	Aliskiren, enalapril, or aliskiren and enalapril in heart failure	162	27
74	Effect of direct vasodilation with hydralazine versus angiotensin-converting enzyme inhibition with captopril on mortality in advanced heart failure: The Hy-C trial	159	5.3
75	Angiotensin-converting enzyme inhibitor as a risk factor for the development of anemia, and the impact of incident anemia on mortality in patients with left ventricular dysfunction	154	9.058823529
76	National patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure	153	6.12
77	National patterns of use and effectiveness of angiotensin-converting enzyme inhibitors in older patients with heart failure and left ventricular systolic dysfunction	148	8.222222222

78	Spironolactone in congestive heart failure refractory to high-dose loop diuretic and low-dose angiotensin-converting enzyme inhibitor	148	5.103448276
79	Differential effects of quinaprilat and enalaprilat on endothelial function of conduit arteries in patients with chronic heart failure	140	5.833333333
80	IMPROVEMENT OF CHRONIC CONGESTIVE HEART-FAILURE BY ORAL CAPTOPRIL	139	3.23255814
81	Pharmacogenetic interactions between angiotensin-converting enzyme inhibitor therapy and the angiotensin-converting enzyme deletion polymorphism in patients with congestive heart failure	138	7.666666667
82	Development of circulatory-renal limitations to angiotensin-converting enzyme inhibitors identifies patients with severe heart failure and early mortality	138	7.263157895
83	Addition of spironolactone to angiotensin-converting enzyme inhibition in heart failure improves endothelial vasomotor dysfunction: Role of vascular superoxide anion formation and endothelial nitric oxide synthase expression	138	6.9
84	Perindopril for elderly people with chronic heart failure: The PEP-CHF study	138	6
85	Effects of enalapril maleate on survival of dogs with naturally acquired heart failure	136	5.666666667
86	Acute regional circulatory and renal hemodynamic effects of converting-enzyme inhibition in patients with congestive heart failure	136	3.317073171
87	Effects of enalapril on mortality in severe congestive heart failure: Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	135	3.970588235
88	Patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure in two community hospitals	134	5.153846154
89	Baseline characteristics and treatment of patients in Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in heart failure trial (PARADIGM-HF)	131	16.375
90	Efficacy and safety of high-dose lisinopril in chronic heart failure patients at high cardiovascular risk, including those with diabetes mellitus: Results from the ATLAS trial	130	5.909090909
91	Enalaprilat augments arterial and cardiopulmonary baroreflex control of sympathetic nerve activity in patients with heart failure	130	5
92	Cardiac remodelling in end stage heart failure: Upregulation of matrix metalloproteinase (MMP) irrespective of the underlying disease, and evidence for a direct inhibitory effect of ACE inhibitors on MMP	128	6.4
93	Failure of aldosterone suppression despite angiotensin-converting enzyme (ACE) inhibitor administration in chronic heart failure is associated with ACE DD genotype	124	5.904761905
94	Effects of spironolactone on endothelial function, vascular angiotensin converting enzyme activity, and other prognostic markers in patients with mild heart failure already taking optimal treatment	123	6.833333333
95	High- versus low-dose ACE inhibition in chronic heart failure: A double- blind, placebo-controlled study of imidapril	123	5.125
96	Heart failure treatment with angiotensin-converting enzyme inhibitors in hospitalized Medicare patients in 10 large states	122	4.88
97	Angiotensin converting enzyme (ACE) and non-ACE dependent angiotensin II generation in resistance arteries from patients with heart failure and coronary heart disease	121	5.761904762
98	Direct renin inhibition in addition to or as an alternative to	120	10.90909091

	angiotensin converting enzyme inhibition in patients with chronic systolic heart failure: Rationale and design of the Aliskiren Trial to Minimize OutcomeS in Patients with HEart failuRE (ATMOSPHERE) study		
99	Acute and long-term effects of enalapril on the cardiovascular response to exercise and exercise tolerance in patients with congestive heart failure	118	3.189189189
100	Lisinopril: A Preliminary Review of its Pharmacodynamic and Pharmacokinetic Properties, and Therapeutic Use in Hypertension and Congestive Heart Failure	117	3.441176471

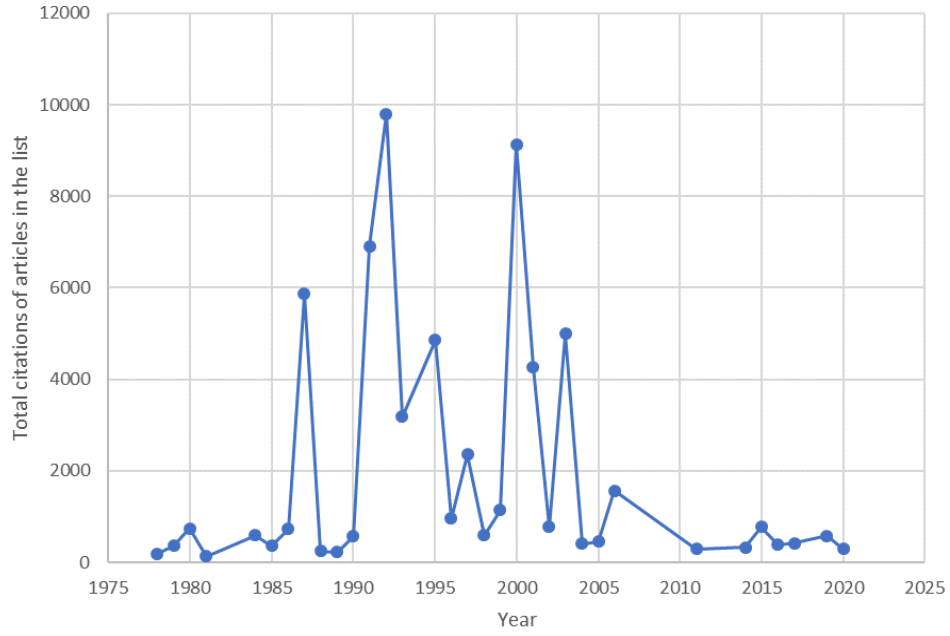

Fig. 1 Total citations of the articles in the list each year

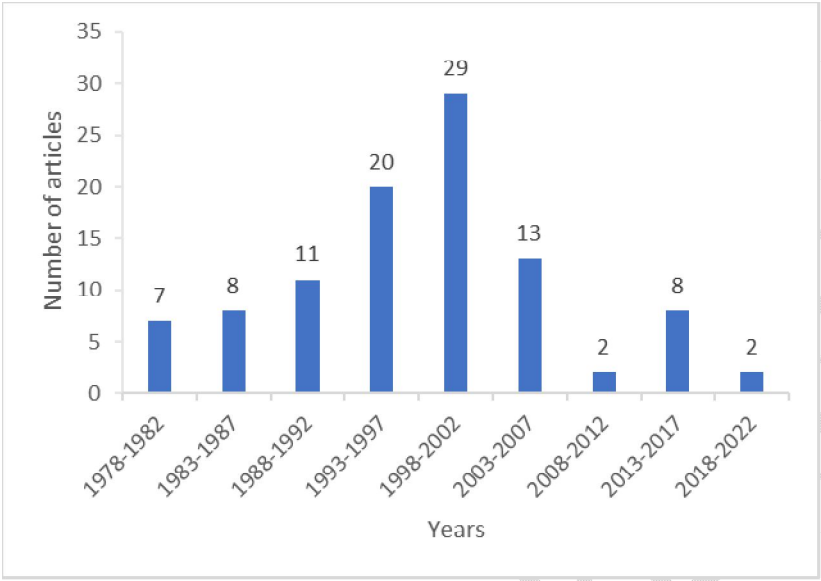

Fig. 2 Number of publications in each 5-year interval

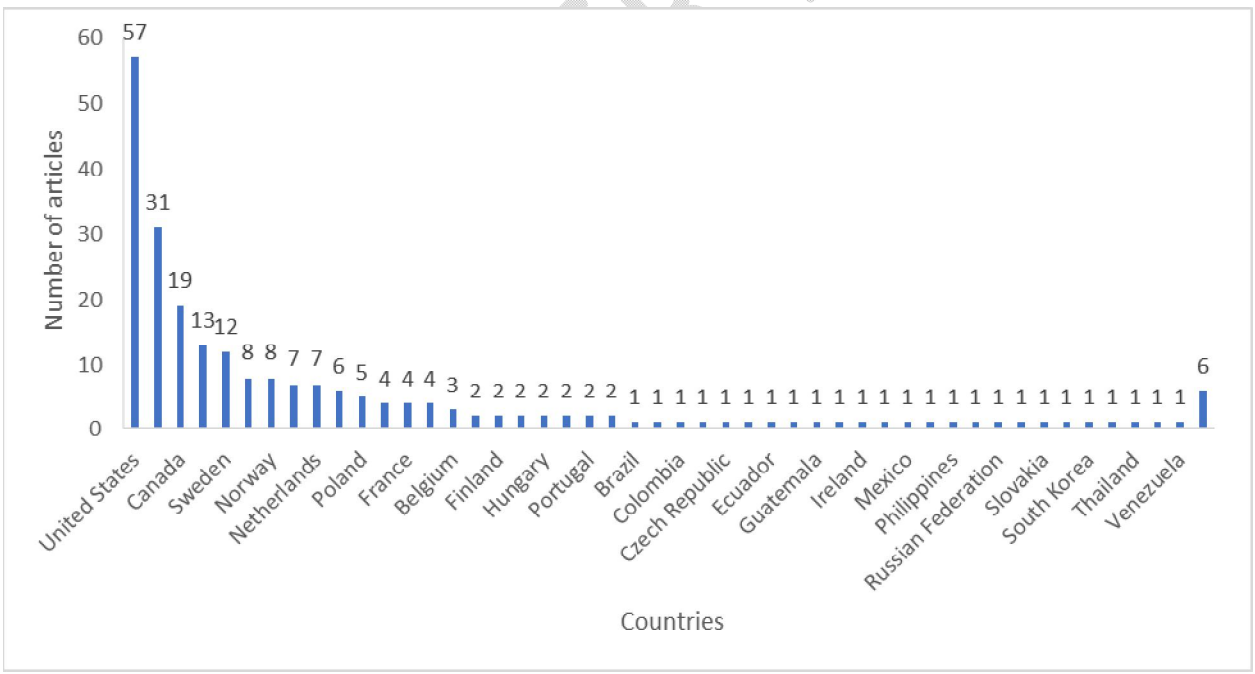

Fig. 3 Number of articles originating from each country

Table 2 Authors with 5 or more articles in the top 100 list

Author	Total Articles	Authorship Position			Author Affiliation	H-index
		first	last	other		
McMurray, J.J.V.	10	3	1	6	Glasgow Cardiovascular Research Centre, Glasgow, United Kingdom	180
Swedberg,	10	3	0	7	Göteborgs Universitet, Department of Molecular	131

K.					and Clinical Medicine, Gothenburg, Sweden	
Packer, M.	9	2	2	5	Baylor Jack and Jane Hamilton Heart and Vascular Hospital, Dallas, United StatesImperial College London, London, United Kingdom	117
Yusuf, S.	9	0	2	7	Population Health Research Institute, Ontario, Hamilton, Canada	231
Rouleau, J.L.	8	1	0	7	Institut de Cardiologie de Montreal, Montreal, Canada	116
Solomon, S.D.	7	0	2	5	Harvard Medical School, Boston, United States	145
Cleland, J.G.F.	6	4	0	2	University of Glasgow, Glasgow, United Kingdom	138
Desai, A.S.	6	1	0	5	Harvard Medical School, Cardiovascular Division, Boston, United States	76
Dickstein, K.	6	1	0	5	Stavanger University Hospital, Department of Cardiology, Stavanger, Norway	91
Cohn, J.N.	5	1	4	0	University of Minnesota Medical School, Cardiovascular Division, Minneapolis, United States	107
Pitt, B.	5	4	0	1	University of Michigan Medical School, Ann Arbor, United States	122

Table 3 Journals with more than 1 article in the list

Journal's name	Number of articles	Impact Factor
Circulation	21	23.054
Journal Of The American College Of Cardiology	15	18.639
New England Journal Of Medicine	15	70.67
Lancet	12	59.102
European Heart Journal	8	23.239
American Journal Of Cardiology	7	2.843
European Journal Of Heart Failure	3	13.965
Heart	3	5.082
Archives Of Internal Medicine	2	44.41
British Heart Journal	2	7.369
Circulation Heart Failure	2	6.526

Table 4 Institution affiliated with 6 or more articles in the list

Institute	Number of documents
Brigham and Women's Hospital	14
University of Glasgow	11
Institut de Cardiologie de Montreal	11
Novartis International AG	9
University of California, San Francisco	7
Harvard Medical School	6
University of Montreal	6
National Heart and Lung Institute	6
VA Medical Center	6
Sahlgrenska Universitetssjukhuset	6
University of Dundee School of Medicine	6

Table 5: Top 100 studies author's Gender Status

Rank	Title	gender			

		First author	Second author	Third author	Last author
1	Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure				
2	Effect of Captopril on Mortality and Morbidity in Patients with Left Ventricular Dysfunction after Myocardial Infarction: Results of the Survival and Ventricular Enlargement Trial	M	M	M	M
3	Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	M	M	M	
4	Effect of Enalapril on Mortality and the Development of Heart Failure in Asymptomatic Patients with Reduced Left Ventricular Ejection Fractions				
5	Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE study and MICRO-HOPE substudy	M	M	M	M
6	A randomized trial of the angiotensin-receptor blocker valsartan in chronic heart failure	M	M		
7	Effect of ramipril on mortality and morbidity of survivors of acute myocardial infarction with clinical evidence of heart failure				
8	Valsartan, Captopril, or Both in Myocardial Infarction Complicated by Heart Failure, Left Ventricular Dysfunction, or Both	M	M	M	M
9	Effect of losartan compared with captopril on mortality in patients with symptomatic heart failure: Randomised trial - The Losartan Heart Failure Survival Study ELITE II	M	M	M	M
10	Overview of Randomized Trials of Angiotensin-Converting Enzyme Inhibitors on Mortality and Morbidity in Patients With Heart Failure	F	M		
11	Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin-converting-enzyme inhibitors: The CHARM-added trial	M	M	M	M
12	Randomised trial of losartan versus captopril in patients over 65 with heart failure (Evaluation of Losartan in the Elderly Study, ELITE)	M	M	M	M
13	A clinical trial of the angiotensin-converting–enzyme inhibitor trandolapril in patients with left ventricular dysfunction after myocardial infarction	M	M	M	M
14	Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: Results of prospectively designed overviews of randomised trials	M	M	M	M
15	Long-term ACE-inhibitor therapy in patients with heart failure or left-ventricular dysfunction: A systematic overview of data from individual patients	M	M	M	M
16	Effects of Enalapril on Mortality in Severe Congestive Heart Failure				
17	The perindopril in elderly people with chronic heart	M	M	M	F

	failure (PEP-CHF) study				
18	The effect of the angiotensin-converting⇓enzyme inhibitor zofenopril on mortality and morbidity after anterior myocardial infarction	M	M	M	
19	Effects of angiotensin-converting enzyme inhibition on the development of the atrial fibrillation substrate in dogs with ventricular tachypacing - Induced congestive heart failure	F	F	F	M
20	Angiotensin-neprilysin inhibition in acute decompensated heart failure	M	M	M	M
21	Angiotensin II-forming pathways in normal and failing human hearts	M	F	M	M
22	Enalapril decreases the incidence of atrial fibrillation in patients with left ventricular dysfunction: Insight from the studies of left ventricular dysfunction (SOLVD) trials	F	M	M	F
23	Prognostic importance of serum sodium concentration and its modification by converting-enzyme inhibition in patients with severe chronic heart failure	M	M		
24	Angiotensin receptor neprilysin inhibition compared with enalapril on the risk of clinical progression in surviving patients with heart failure	M	M	M	M
25	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dysfunction in patients with heart failure	M	M	M	F
26	Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction	M	M	M	M
27	Effectiveness of Spironolactone added to an angiotensin-converting enzyme inhibitor and a loop diuretic for severe chronic congestive heart failure (The Randomized Aldactone Evaluation Study [RALES])	M			
28	Angiotensin-converting-enzyme inhibitors in stable vascular disease without left ventricular systolic dysfunction or heart failure: a combined analysis of three trials	M	F	F	M
29	Comparison of vasopeptidase inhibitor, omapatrilat, and lisinopril on exercise tolerance and morbidity in patients with heart failure: IMPRESS randomised trial	M	M	M	M
30	Captopril in heart failure. A double blind controlled trial	M	M	M	M
31	Effects of adding spironolactone to an angiotensin-converting enzyme inhibitor in chronic congestive heart failure secondary to coronary artery disease	M	M	F	M
32	Sustained Effectiveness of Converting-Enzyme Inhibition in Patients with Severe Congestive Heart Failure	M	M	M	M
33	Effect on survival and hospitalization of initiating treatment for chronic heart failure with bisoprolol followed by enalapril, as compared with the opposite sequence: Results of the Randomized	M	M	M	M

	Cardiac Insufficiency Bisoprolol Study (CIBIS) III				
34	Effects of valsartan on morbidity and mortality in patients with heart failure not receiving angiotensin-converting enzyme inhibitors	M	M	M	M
35	Circulating plasma concentrations of angiotensin-converting enzyme 2 inmen and women with heart failure and effects of renin-angiotensin-aldosterone inhibitors	M	F	F	M
36	Effect of the angiotensin-receptor-neprilysin inhibitor LCZ696 compared with enalapril on mode of death in heart failure patients	M	M	M	M
37	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dilatation in patients with asymptomatic systolic dysfunction	M	M	M	M
38	Increased angiotensin-(1-7)-forming activity in failing human heart ventricles: Evidence for upregulation of the angiotensin-converting enzyme homologue ACE2	M	F	F	M
39	Early prevention of left ventricular dysfunction after myocardial infarction with angiotensin-converting-enzyme inhibition	M	F	F	M
40	Effect of propranolol versus no propranolol on total mortality plus nonfatal myocardial infarction in older patients with prior myocardial infarction, congestive heart failure, and left ventricular ejection fraction ≤40% treated with diuretics plus angiotensin-converting enzyme inhibitors	M	M	M	
41	Effects of enalapril in heart failure: A double blind study of effects on exercise performance, renal function, hormones, and metabolic state	M	M	M	M
42	Immediate and sustained hemodynamic and clinical improvement in chronic heart failure by an oral angiotensin-converting enzyme inhibitor	M	M	M	M
43	Comparison of Captopril and Enalapril in Patients with Severe Chronic Heart Failure	M	M	F	F
44	Enalapril in patients with chronic heart failure: A placebo-controlled, randomized, double-blind study	M	F	F	F
45	Enalapril reduces the incidence of diabetes in patients with chronic heart failure: Insight from the studies of left ventricular dysfunction (SOLVD)	F	F	M	M
46	Clinical implications of increased plasma angiotensin II despite ACE inhibitor therapy in patients with congestive heart failure	F	M	F	Sanz, Ginés A.
47	Counteraction of the vasodilator effects of enalapril by aspirin in severe heart failure	M	M	M	
48	Risk Related to Pre-Diabetes Mellitus and Diabetes Mellitus in Heart Failure with Reduced Ejection Fraction: Insights from Prospective Comparison of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure Trial	M	M	M	M
49	Treatment of Chronic Congestive Heart Failure with Captopril, an Oral Inhibitor of Angiotensin-Converting Enzyme	M	M	M	M
50	Aldosterone escape during angiotensin-converting	M			

	enzyme inhibitor therapy in chronic heart failure				
51	Contrasting peripheral short-term and long-term effects of converting enzyme inhibition in patients with congestive heart failure. A double-blind, placebo-controlled trial	M	M	M	Just, Hanjoerg J.
52	Effect of high- versus low-dose angiotensin converting enzyme inhibition on cytokine levels in chronic heart failure	M	M	M	M
53	Determinants and clinical outcome of uptitration of ACE-inhibitors and beta-blockers in patients with heart failure: A prospective European study	M	M	M	M
54	Enalapril effects on atrial remodeling and atrial fibrillation in experimental congestive heart failure	Shi, Yanfen	F	M	M
55	"Escape" of aldosterone production in patients with left ventricular dysfunction treated with an angiotensin converting enzyme inhibitor: Implications for therapy	M			
56	Systolic versus diastolic heart failure in community practice: Clinical features, outcomes, and the use of angiotensin-converting enzyme inhibitors	M	M	M	M
57	Sustained augmentation of parasympathetic tone with angiotensin-converting enzyme inhibition in patients with congestive heart failure	M	M	M	M
58	Augmented short- and long-term hemodynamic and hormonal effects of an angiotensin receptor blocker added to angiotensin converting enzyme inhibitor therapy in patients with heart failure	M	M	M	M
59	Effect of sacubitril/valsartan versus enalapril on glycaemic control in patients with heart failure and diabetes: a post-hoc analysis from the PARADIGM-HF trial	F	M	F	M
60	Effect of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers on all-cause mortality, cardiovascular deaths, and cardiovascular events in patients with diabetes mellitus: A meta-analysis	M	M	M	M
61	Addition of angiotensin II receptor blockade to maximal angiotensin- converting enzyme inhibition improves exercise capacity in patients with severe congestive heart failure	M	M	F	M
62	Effect of enalapril on congestive heart failure treated with diuretics in elderly patients with prior myocardial infarction and normal left ventricular ejection fraction	M	M		
63	Acute and long-term response to an oral converting-enzyme inhibitor, captopril, in congestive heart failure	M	M	M	
64	Clinical outcome with enalapril in symptomatic chronic heart failure; A dose comparison	M	M	M	M
65	Angiotensin converting enzyme inhibition in patients with congestive heart failure	M	M	Berkoben , J. P.	M
66	Maximally recommended doses of angiotensin-converting enzyme (ACE) inhibitors do not completely prevent ACE-mediated formation of angiotensin II in chronic heart failure	M	M	M	M

67	Long-term survival in severe heart failure in patients treated with enalapril. Ten year follow-up of CONSENSUS I	M	M	M	
68	Abnormalities of hemorheological, endothelial, and platelet function in patients with chronic heart failure in sinus rhythm: Effects of angiotensin-converting enzyme inhibitor and β-blocker therapy	M	M	M	M
69	Comparison of the effects of losartan and enalapril on clinical status and exercise performance in patients with moderate or severe chronic heart failure	M	M	M	M
70	How often are angiotensin II and aldosterone concentrations raised during chronic ACE inhibitor treatment in cardiac failure?	F	F	M	M
71	Follow-up study of patients randomly allocated ramipril or placebo for heart failure after acute myocardial infarction: AIRE Extension (AIREX) Study	M	M	M	
72	Prognostic importance of early worsening renal function after initiation of angiotensin-converting enzyme inhibitor therapy in patients with cardiac dysfunction	M	M	M	M
73	Aliskiren, enalapril, or aliskiren and enalapril in heart failure	M	M	M	M
74	Effect of direct vasodilation with hydralazine versus angiotensin-converting enzyme inhibition with captopril on mortality in advanced heart failure: The Hy-C trial	M	F	F	F
75	Angiotensin-converting enzyme inhibitor as a risk factor for the development of anemia, and the impact of incident anemia on mortality in patients with left ventricular dysfunction	M	M	M	M
76	National patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure	M	F	M	
77	National patterns of use and effectiveness of angiotensin-converting enzyme inhibitors in older patients with heart failure and left ventricular systolic dysfunction	M	M	M	M
78	Spironolactone in congestive heart failure refractory to high-dose loop diuretic and low-dose angiotensin-converting enzyme inhibitor	van Vliet, AndréA.	Donker, Ab J.M.	Nauta, Jos J.P.	M
79	Differential effects of quinaprilat and enalaprilat on endothelial function of conduit arteries in patients with chronic heart failure	M	F	M	M
80	IMPROVEMENT OF CHRONIC CONGESTIVE HEART-FAILURE BY ORAL CAPTOPRIL	Turini GustaveA.	M	Gribic, Milan	M
81	Pharmacogenetic interactions between angiotensin-converting enzyme inhibitor therapy and the angiotensin-converting enzyme deletion polymorphism in patients with congestive heart failure	M	M	F	M
82	Development of circulatory-renal limitations to angiotensin-converting enzyme inhibitors identifies patients with severe heart failure and early mortality	F	F	F	F

83	Addition of spironolactone to angiotensin-converting enzyme inhibition in heart failure improves endothelial vasomotor dysfunction: Role of vascular superoxide anion formation and endothelial nitric oxide synthase expression	M	F	F	M
84	Perindopril for elderly people with chronic heart failure: The PEP-CHF study	M	M	M	F
85	Effects of enalapril maleate on survival of dogs with naturally acquired heart failure	M	M	M	M
86	Acute regional circulatory and renal hemodynamic effects of converting-enzyme inhibition in patients with congestive heart failure	M	M	M	M
87	Effects of enalapril on mortality in severe congestive heart failure: Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	M	M		
88	Patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure in two community hospitals	M	M	M	F
89	Baseline characteristics and treatment of patients in Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in heart failure trial (PARADIGM-HF)	M	M	M	M
90	Efficacy and safety of high-dose lisinopril in chronic heart failure patients at high cardiovascular risk, including those with diabetes mellitus: Results from the ATLAS trial	M	M	M	M
91	Enalaprilat augments arterial and cardiopulmonary baroreflex control of sympathetic nerve activity in patients with heart failure	M	M	M	M
92	Cardiac remodelling in end stage heart failure: Upregulation of matrix metalloproteinase (MMP) irrespective of the underlying disease, and evidence for a direct inhibitory effect of ACE inhibitors on MMP	M	M	F	M
93	Failure of aldosterone suppression despite angiotensin-converting enzyme (ACE) inhibitor administration in chronic heart failure is associated with ACE DD genotype	F	F	F	M
94	Effects of spironolactone on endothelial function, vascular angiotensin converting enzyme activity, and other prognostic markers in patients with mild heart failure already taking optimal treatment	M	M	M	
95	High- versus low-dose ACE inhibition in chronic heart failure: A double- blind, placebo-controlled study of imidapril	M	F	M	M
96	Heart failure treatment with angiotensin-converting enzyme inhibitors in hospitalized Medicare patients in 10 large states	M	M	M	M
97	Angiotensin converting enzyme (ACE) and non-ACE dependent angiotensin II generation in resistance arteries from patients with heart failure and coronary heart disease	M	Padmanabhan, Neal	M	M
98	Direct renin inhibition in addition to or as an alternative to angiotensin converting enzyme	M	M	M	M

	inhibition in patients with chronic systolic heart failure: Rationale and design of the Aliskiren Trial to Minimize OutcomeS in Patients with HEart failuRE (ATMOSPHERE) study				
99	Acute and long-term effects of enalapril on the cardiovascular response to exercise and exercise tolerance in patients with congestive heart failure	M	M	M	F
100	Lisinopril: A Preliminary Review of its Pharmacodynamic and Pharmacokinetic Properties, and Therapeutic Use in Hypertension and Congestive Heart Failure	M	M		

Table: 6 Gender status of authors

Author list	Male authors	Female authors
1st Author	84	9
2nd Author	74	17
3rd Author	67	17
Last Author	66	10

Table 7: Studies with Authors' race status

Rank	Title	race			
		First author	Second author	Third author	Last author
1	Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure				
2	Effect of Captopril on Mortality and Morbidity in Patients with Left Ventricular Dysfunction after Myocardial Infarction: Results of the Survival and Ventricular Enlargement Trial	White	White	Black	Black
3	Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	White	White	White	
4	Effect of Enalapril on Mortality and the Development of Heart Failure in Asymptomatic Patients with Reduced Left Ventricular Ejection Fractions				
5	Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE study and MICRO-HOPE substudy	White	Asian	White	White
6	A randomized trial of the angiotensin-receptor blocker valsartan in chronic heart failure	White	White		
7	Effect of ramipril on mortality and morbidity of survivors of acute myocardial infarction with clinical evidence of heart failure				
8	Valsartan, Captopril, or Both in Myocardial Infarction Complicated by Heart Failure, Left Ventricular Dysfunction, or Both	White	White	White	White
9	Effect of losartan compared with captopril on mortality in patients with symptomatic heart failure: Randomised trial - The Losartan Heart Failure Survival Study	White	White	White	Thiyagarajan, B.

	ELITE II				
10	Overview of Randomized Trials of Angiotensin-Converting Enzyme Inhibitors on Mortality and Morbidity in Patients With Heart Failure	Asian	Asian		
11	Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin-converting-enzyme inhibitors: The CHARM-added trial	White	White	White	White
12	Randomised trial of losartan versus captopril in patients over 65 with heart failure (Evaluation of Losartan in the Elderly Study, ELITE)	White	White	White	Asian
13	A clinical trial of the angiotensin-converting–enzyme inhibitor trandolapril in patients with left ventricular dysfunction after myocardial infarction	White	White	White	White
14	Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: Results of prospectively designed overviews of randomised trials	White	White	White	White
15	Long-term ACE-inhibitor therapy in patients with heart failure or left-ventricular dysfunction: A systematic overview of data from individual patients	White	Asian	White	White
16	Effects of Enalapril on Mortality in Severe Congestive Heart Failure				
17	The perindopril in elderly people with chronic heart failure (PEP-CHF) study	White	White	White	White
18	The effect of the angiotensin-converting⇓enzyme inhibitor zofenopril on mortality and morbidity after anterior myocardial infarction	White	White	Magnani, Bruno	
19	Effects of angiotensin-converting enzyme inhibition on the development of the atrial fibrillation substrate in dogs with ventricular tachypacing - Induced congestive heart failure	Asian	asian	Asian	White
20	Angiotensin-neprilysin inhibition in acute decompensated heart failure	White	White	White	White
21	Angiotensin II-forming pathways in normal and failing human hearts	Asian	White	White	Asian
22	Enalapril decreases the incidence of atrial fibrillation in patients with left ventricular dysfunction: Insight from the studies of left ventricular dysfunction (SOLVD) trials	White	White	White	White
23	Prognostic importance of serum sodium concentration and its modification by converting-enzyme inhibition in patients with severe chronic heart failure	Asian	White		
24	Angiotensin receptor neprilysin inhibition compared with enalapril on the risk of clinical progression in surviving patients with heart failure	White	White	Asian	Asian

25	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dysfunction in patients with heart failure	White	White	White	White
26	Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction	White	White	White	White
27	Effectiveness of Spironolactone added to an angiotensin-converting enzyme inhibitor and a loop diuretic for severe chronic congestive heart failure (The Randomized Aldactone Evaluation Study [RALES])	White			
28	Angiotensin-converting-enzyme inhibitors in stable vascular disease without left ventricular systolic dysfunction or heart failure: a combined analysis of three trials	White	White	Fox, Kim	Asian
29	Comparison of vasopeptidase inhibitor, omapatrilat, and lisinopril on exercise tolerance and morbidity in patients with heart failure: IMPRESS randomised trial	White	White	White	White
30	Captopril in heart failure. A double blind controlled trial	White	White	Hodsman, G. Peter	White
31	Effects of adding spironolactone to an angiotensin-converting enzyme inhibitor in chronic congestive heart failure secondary to coronary artery disease	Barr, Craig S.	Asian	Hanson, Jacqueline	White
32	Sustained Effectiveness of Converting-Enzyme Inhibition in Patients with Severe Congestive Heart Failure	Asian	White	White	White
33	Effect on survival and hospitalization of initiating treatment for chronic heart failure with bisoprolol followed by enalapril, as compared with the opposite sequence: Results of the Randomized Cardiac Insufficiency Bisoprolol Study (CIBIS) III	White	White	Silke, Bernard	White
34	Effects of valsartan on morbidity and mortality in patients with heart failure not receiving angiotensin-converting enzyme inhibitors	White	Asian	White	White
35	Circulating plasma concentrations of angiotensin-converting enzyme 2 inmen and women with heart failure and effects of renin-angiotensin-aldosterone inhibitors	Black	White	White	White
36	Effect of the angiotensin-receptor-neprilysin inhibitor LCZ696 compared with enalapril on mode of death in heart failure patients	Asian	White	White	White
37	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dilatation in patients with asymptomatic systolic dysfunction	White	White	White	White
38	Increased angiotensin-(1-7)-forming activity in failing human heart ventricles: Evidence	Zisman, Lawrence	Keller, Rebecca S.	Weaver, Barbara	White

	for upregulation of the angiotensin-converting enzyme homologue ACE2	S.			
39	Early prevention of left ventricular dysfunction after myocardial infarction with angiotensin-converting-enzyme inhibition	White	White	White	White
40	Effect of propranolol versus no propranolol on total mortality plus nonfatal myocardial infarction in older patients with prior myocardial infarction, congestive heart failure, and left ventricular ejection fraction ≤40% treated with diuretics plus angiotensin-converting enzyme inhibitors	White	Asian	White	
41	Effects of enalapril in heart failure: A double blind study of effects on exercise performance, renal function, hormones, and metabolic state	White	White	White	White
42	Immediate and sustained hemodynamic and clinical improvement in chronic heart failure by an oral angiotensin-converting enzyme inhibitor	White	Asian	White	White
43	Comparison of Captopril and Enalapril in Patients with Severe Chronic Heart Failure	White	Asian	Yushak, Madeline	Medina, Norma
44	Enalapril in patients with chronic heart failure: A placebo-controlled, randomized, double-blind study	White	White	Coxon, Renee	Hannan, Sharon F.
45	Enalapril reduces the incidence of diabetes in patients with chronic heart failure: Insight from the studies of left ventricular dysfunction (SOLVD)	White	White	White	White
46	Clinical implications of increased plasma angiotensin II despite ACE inhibitor therapy in patients with congestive heart failure	White	White	Morales, Manel Luna	Sanz, Ginés A.
47	Counteraction of the vasodilator effects of enalapril by aspirin in severe heart failure	Hall, Donald	White	Rudolph, Werner	
48	Risk Related to Pre-Diabetes Mellitus and Diabetes Mellitus in Heart Failure with Reduced Ejection Fraction: Insights from Prospective Comparison of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure Trial	White	White	Asian	White
49	Treatment of Chronic Congestive Heart Failure with Captopril, an Oral Inhibitor of Angiotensin-Converting Enzyme	Davis, Richard	Ribner, Hillel S.	Asian	White
50	Aldosterone escape during angiotensin-converting enzyme inhibitor therapy in chronic heart failure	White			
51	Contrasting peripheral short-term and long-term effects of converting enzyme inhibition in patients with congestive heart failure. A double-blind, placebo-controlled trial	White	Banhardt, Ulrich	White	Just, Hanjoerg J.
52	Effect of high- versus low-dose angiotensin converting enzyme inhibition on cytokine levels in chronic heart failure	White	White	White	White
53	Determinants and clinical outcome of	White	White	White	White

	uptitration of ACE-inhibitors and beta-blockers in patients with heart failure: A prospective European study				
54	Enalapril effects on atrial remodeling and atrial fibrillation in experimental congestive heart failure	Asian	Asian	White	White
55	"Escape" of aldosterone production in patients with left ventricular dysfunction treated with an angiotensin converting enzyme inhibitor: Implications for therapy	White			
56	Systolic versus diastolic heart failure in community practice: Clinical features, outcomes, and the use of angiotensin-converting enzyme inhibitors	White	White	Lindenmuth, Norman W	White
57	Sustained augmentation of parasympathetic tone with angiotensin-converting enzyme inhibition in patients with congestive heart failure	White	White	White	White
58	Augmented short- and long-term hemodynamic and hormonal effects of an angiotensin receptor blocker added to angiotensin converting enzyme inhibitor therapy in patients with heart failure	White	Asian	White	White
59	Effect of sacubitril/valsartan versus enalapril on glycaemic control in patients with heart failure and diabetes: a post-hoc analysis from the PARADIGM-HF trial	White	White	White	White
60	Effect of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers on all-cause mortality, cardiovascular deaths, and cardiovascular events in patients with diabetes mellitus: A meta-analysis	Asian	Asian	Asian	Asian
61	Addition of angiotensin II receptor blockade to maximal angiotensin- converting enzyme inhibition improves exercise capacity in patients with severe congestive heart failure	White	White	White	White
62	Effect of enalapril on congestive heart failure treated with diuretics in elderly patients with prior myocardial infarction and normal left ventricular ejection fraction	White	White		
63	Acute and long-term response to an oral converting-enzyme inhibitor, captopril, in congestive heart failure	Levine, T. Barry	Franciosa, Joseph A.	White	
64	Clinical outcome with enalapril in symptomatic chronic heart failure; A dose comparison	White	White	Asian	Asian
65	Angiotensin converting enzyme inhibition in patients with congestive heart failure	Gavras H.	White	Berkoben, J. P.	White
66	Maximally recommended doses of angiotensin-converting enzyme (ACE) inhibitors do not completely prevent ACE-mediated formation of angiotensin II in chronic heart failure	White	White	White	White

67	Long-term survival in severe heart failure in patients treated with enalapril. Ten year follow-up of CONSENSUS I	White	White	White	
68	Abnormalities of hemorheological, endothelial, and platelet function in patients with chronic heart failure in sinus rhythm: Effects of angiotensin-converting enzyme inhibitor and β-blocker therapy	White	White	White	Asian
69	Comparison of the effects of losartan and enalapril on clinical status and exercise performance in patients with moderate or severe chronic heart failure	White	Asian	Willenheimer, Ronnie	White
70	How often are angiotensin II and aldosterone concentrations raised during chronic ACE inhibitor treatment in cardiac failure?	White	Asian	Morton, James J.	White
71	Follow-up study of patients randomly allocated ramipril or placebo for heart failure after acute myocardial infarction: AIRE Extension (AIREX) Study	White	White	White	
72	Prognostic importance of early worsening renal function after initiation of angiotensin-converting enzyme inhibitor therapy in patients with cardiac dysfunction	White	White	White	White
73	Aliskiren, enalapril, or aliskiren and enalapril in heart failure	White	White	White	White
74	Effect of direct vasodilation with hydralazine versus angiotensin-converting enzyme inhibition with captopril on mortality in advanced heart failure: The Hy-C trial	White	White	White	Albanese, Elaine
75	Angiotensin-converting enzyme inhibitor as a risk factor for the development of anemia, and the impact of incident anemia on mortality in patients with left ventricular dysfunction	Asian	White	Asian	White
76	National patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure	White	White	White	
77	National patterns of use and effectiveness of angiotensin-converting enzyme inhibitors in older patients with heart failure and left ventricular systolic dysfunction	White	Asian	Asian	White
78	Spironolactone in congestive heart failure refractory to high-dose loop diuretic and low-dose angiotensin-converting enzyme inhibitor	van Vliet, AndréA.	Donker, Ab J.M.	Nauta, Jos J.P.	White
79	Differential effects of quinaprilat and enalaprilat on endothelial function of conduit arteries in patients with chronic heart failure	White	Asian	White	White
80	IMPROVEMENT OF CHRONIC CONGESTIVE HEART-FAILURE BY ORAL CAPTOPRIL	Turini GustaveA.	White	Gribic, Milan	White
81	Pharmacogenetic interactions between	White	White	Postava, Lisa	White

	angiotensin-converting enzyme inhibitor therapy and the angiotensin-converting enzyme deletion polymorphism in patients with congestive heart failure				
82	Development of circulatory-renal limitations to angiotensin-converting enzyme inhibitors identifies patients with severe heart failure and early mortality	White	White	Asian	White
83	Addition of spironolactone to angiotensin-converting enzyme inhibition in heart failure improves endothelial vasomotor dysfunction: Role of vascular superoxide anion formation and endothelial nitric oxide synthase expression	White	Heck, Marina	White	Christ, Michael
84	Perindopril for elderly people with chronic heart failure: The PEP-CHF study	White	White	White	White
85	Effects of enalapril maleate on survival of dogs with naturally acquired heart failure	White	Benitz, Antonio M.	White	White
86	Acute regional circulatory and renal hemodynamic effects of converting-enzyme inhibition in patients with congestive heart failure	White	White	White	White
87	Effects of enalapril on mortality in severe congestive heart failure: Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	White	White		
88	Patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure in two community hospitals	White	White	White	Baker, Sharon L.
89	Baseline characteristics and treatment of patients in Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in heart failure trial (PARADIGM-HF)	White	White	Asian	White
90	Efficacy and safety of high-dose lisinopril in chronic heart failure patients at high cardiovascular risk, including those with diabetes mellitus: Results from the ATLAS trial	White	White	White	White
91	Enalaprilat augments arterial and cardiopulmonary baroreflex control of sympathetic nerve activity in patients with heart failure	White	White	Asian	White
92	Cardiac remodelling in end stage heart failure: Upregulation of matrix metalloproteinase (MMP) irrespective of the underlying disease, and evidence for a direct inhibitory effect of ACE inhibitors on MMP	White	White	White	White
93	Failure of aldosterone suppression despite angiotensin-converting enzyme (ACE) inhibitor administration in chronic heart failure is associated with ACE DD genotype	White	White	White	White
94	Effects of spironolactone on endothelial	MacDonald,	Kennedy,	White	

	function, vascular angiotensin converting enzyme activity, and other prognostic markers in patients with mild heart failure already taking optimal treatment	John E.	Norman S.J.		
95	High- versus low-dose ACE inhibition in chronic heart failure: A double- blind, placebo-controlled study of imidapril	White	White	White	White
96	Heart failure treatment with angiotensin-converting enzyme inhibitors in hospitalized Medicare patients in 10 large states	White	Asian	White	White
97	Angiotensin converting enzyme (ACE) and non-ACE dependent angiotensin II generation in resistance arteries from patients with heart failure and coronary heart disease	White	Padmanabhan, Neal	White	White
98	Direct renin inhibition in addition to or as an alternative to angiotensin converting enzyme inhibition in patients with chronic systolic heart failure: Rationale and design of the Aliskiren Trial to Minimize OutcomeS in Patients with HEart failuRE (ATMOSPHERE) study	White	White	White	Armbrecht, Juergen
99	Acute and long-term effects of enalapril on the cardiovascular response to exercise and exercise tolerance in patients with congestive heart failure	White	White	White	Melidossian, Caroline D.
100	Lisinopril: A Preliminary Review of its Pharmacodynamic and Pharmacokinetic Properties, and Therapeutic Use in Hypertension and Congestive Heart Failure	White	White		

Table 8: Total number of Author's with race status

No. of authors of white origin (n=263)		
	1st Author	77
	2nd Author	68
	3rd Author	58
	Last Author	60
No. of authors of black origin (n=3)		
	1st Author	1
	2nd Author	0
	3rd Author	1
	Last Author	1
No. of authors of asian origin (n=44)		
	1st Author	9
	2nd Author	17
	3rd Author	11
	Last Author	7
Race not clear (n=45)		

Table 9: Title funding

Rank	Title	Funding				
		Yes/No	Pharma	NGO	Gov	other
1	Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure	no				
2	Effect of Captopril on Mortality and Morbidity in Patients with Left Ventricular Dysfunction after Myocardial Infarction: Results of the Survival and Ventricular Enlargement Trial	yes	grant from Bristol-Myers Squibb Institute for Pharmaceutical Research			
3	Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	yes	grant from Merck Sharp and Dohme Research Laboratories			
4	Effect of Enalapril on Mortality and the Development of Heart Failure in Asymptomatic Patients with Reduced Left Ventricular Ejection Fractions	yes	Merck Sharp and Dohme		National Heart, Lung, and Blood Institute	
5	Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE study and MICRO-HOPE substudy	yes	Hoechst-Marion Roussel; AstraZeneca; King Pharmaceuticals		Medical Research Council of Canada	
6	A randomized trial of the angiotensin-receptor blocker valsartan in chronic heart failure	yes	grant from Novartis Pharma			
7	Effect of ramipril on mortality and morbidity of survivors of acute myocardial infarction with clinical evidence of heart failure	yes	Hoechst			
8	Valsartan, Captopril, or Both in Myocardial Infarction Complicated by Heart Failure, Left Ventricular Dysfunction, or Both	yes	grant from Novartis Pharmaceuticals			
9	Effect of losartan compared with captopril on mortality in patients with symptomatic heart failure: Randomised trial - The Losartan Heart Failure Survival Study ELITE II	yes	Merck Research Laboratories			
10	Overview of Randomized Trials of Angiotensin-Converting Enzyme Inhibitors on Mortality and Morbidity in Patients With Heart Failure	no				
11	Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin-converting-enzyme inhibitors: The CHARM-added trial	yes	AstraZeneca R&D			
12	Randomised trial of losartan versus captopril in patients over 65 with heart failure (Evaluation of Losartan in the	yes		Merck Research Laboratories		

	Elderly Study, ELITE)					
13	A clinical trial of the angiotensin-converting–enzyme inhibitor trandolapril in patients with left ventricular dysfunction after myocardial infarction	yes	grants from Roussel–Uclaf and Knoll			
14	Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: Results of prospectively designed overviews of randomised trials	yes	AstraZeneca	National Heart Foundation of Australia	National Health and Medical Research Council of Australia	Medical Foundation of the University of Sydney
15	Long-term ACE-inhibitor therapy in patients with heart failure or left-ventricular dysfunction: A systematic overview of data from individual patients	yes	Merck Sharpe and Dohme, Bristol Myers, Squibb, Hoechst		grant from Medical Research Council of Canada	
16	Effects of Enalapril on Mortality in Severe Congestive Heart Failure	yes	grant from Merck Sharp and Dohme Research Laboratories,			
17	The perindopril in elderly people with chronic heart failure (PEP-CHF) study	yes	Servier			
18	The effect of the angiotensin-converting⇓enzyme inhibitor zofenopril on mortality and morbidity after anterior myocardial infarction	yes	grant from the Bristol-Myers Squibb Institute for Pharmaceutical Research			
19	Effects of angiotensin-converting enzyme inhibition on the development of the atrial fibrillation substrate in dogs with ventricular tachypacing - Induced congestive heart failure	yes		Quebec Heart Foundation	Canadian Institutes of Health Research	
20	Angiotensin-neprilysin inhibition in acute decompensated heart failure	yes	Novartis			
21	Angiotensin II-forming pathways in normal and failing human hearts	no				
22	Enalapril decreases the incidence of atrial fibrillation in patients with left ventricular dysfunction: Insight from the studies of left ventricular dysfunction (SOLVD) trials	no				
23	Prognostic importance of serum sodium concentration and its modification by converting-enzyme inhibition in patients with severe chronic heart failure	no				
24	Angiotensin receptor neprilysin inhibition compared with enalapril on the risk of clinical progression in surviving patients with heart failure	yes	Novartis			
25	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular	no				

	dysfunction in patients with heart failure					
26	Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction	no				
27	Effectiveness of Spironolactone added to an angiotensin-converting enzyme inhibitor and a loop diuretic for severe chronic congestive heart failure (The Randomized Aldactone Evaluation Study [RALES])	no				
28	Angiotensin-converting-enzyme inhibitors in stable vascular disease without left ventricular systolic dysfunction or heart failure: a combined analysis of three trials	no				
29	Comparison of vasopeptidase inhibitor, omapatrilat, and lisinopril on exercise tolerance and morbidity in patients with heart failure: IMPRESS randomised trial	no				
30	Captopril in heart failure. A double blind controlled trial	no				
31	Effects of adding spironolactone to an angiotensin-converting enzyme inhibitor in chronic congestive heart failure secondary to coronary artery disease	no				
32	Sustained Effectiveness of Converting-Enzyme Inhibition in Patients with Severe Congestive Heart Failure	yes			grants from National Institutes of Health	
33	Effect on survival and hospitalization of initiating treatment for chronic heart failure with bisoprolol followed by enalapril, as compared with the opposite sequence: Results of the Randomized Cardiac Insufficiency Bisoprolol Study (CIBIS) III	yes	Merck KGaA			
34	Effects of valsartan on morbidity and mortality in patients with heart failure not receiving angiotensin-converting enzyme inhibitors	no				
35	Circulating plasma concentrations of angiotensin-converting enzyme 2 inmen and women with heart failure and effects of renin-angiotensin-aldosterone inhibitors	yes				grant from the European Commission
36	Effect of the angiotensin-receptor-neprilysin inhibitor LCZ696 compared with enalapril on mode of death in heart failure patients	yes	Novartis AG			
37	Effects of the angiotensin converting	no				

	enzyme inhibitor enalapril on the long-term progression of left ventricular dilatation in patients with asymptomatic systolic dysfunction					
38	Increased angiotensin-(1-7)-forming activity in failing human heart ventricles: Evidence for upregulation of the angiotensin-converting enzyme homologue ACE2	yes		American Heart Association	National Institutes of Health	
39	Early prevention of left ventricular dysfunction after myocardial infarction with angiotensin-converting-enzyme inhibition	yes	E R Squibb & Sons Ltd.	National Heart Foundation of New Zealand		
40	Effect of propranolol versus no propranolol on total mortality plus nonfatal myocardial infarction in older patients with prior myocardial infarction, congestive heart failure, and left ventricular ejection fraction ≤40% treated with diuretics plus angiotensin-converting enzyme inhibitors	no				
41	Effects of enalapril in heart failure: A double blind study of effects on exercise performance, renal function, hormones, and metabolic state	no				
42	Immediate and sustained hemodynamic and clinical improvement in chronic heart failure by an oral angiotensin-converting enzyme inhibitor	no				
43	Comparison of Captopril and Enalapril in Patients with Severe Chronic Heart Failure	yes			grants from the National Heart, Lung, and Blood Institute	
44	Enalapril in patients with chronic heart failure: A placebo-controlled, randomized, double-blind study	yes	Merck,Sharp&DohmeLimited			
45	Enalapril reduces the incidence of diabetes in patients with chronic heart failure: Insight from the studies of left ventricular dysfunction (SOLVD)	no				
46	Clinical implications of increased plasma angiotensin II despite ACE inhibitor therapy in patients with congestive heart failure	no				
47	Counteraction of the vasodilator effects of enalapril by aspirin in severe heart failure	no				
48	Risk Related to Pre-Diabetes Mellitus and Diabetes Mellitus in Heart Failure with Reduced Ejection Fraction: Insights from Prospective Comparison	yes	Novartis			

	of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure Trial					
49	Treatment of Chronic Congestive Heart Failure with Captopril, an Oral Inhibitor of Angiotensin-Converting Enzyme	no				
50	Aldosterone escape during angiotensin-converting enzyme inhibitor therapy in chronic heart failure	no				
51	Contrasting peripheral short-term and long-term effects of converting enzyme inhibition in patients with congestive heart failure. A double-blind, placebo-controlled trial	no				
52	Effect of high- versus low-dose angiotensin converting enzyme inhibition on cytokine levels in chronic heart failure	no				
53	Determinants and clinical outcome of uptitration of ACE-inhibitors and beta-blockers in patients with heart failure: A prospective European study	yes				European Commission
54	Enalapril effects on atrial remodeling and atrial fibrillation in experimental congestive heart failure	no				
55	"Escape" of aldosterone production in patients with left ventricular dysfunction treated with an angiotensin converting enzyme inhibitor: Implications for therapy	no				
56	Systolic versus diastolic heart failure in community practice: Clinical features, outcomes, and the use of angiotensin-converting enzyme inhibitors	yes			grants from the New York State Department of Health	VHA Empire State
57	Sustained augmentation of parasympathetic tone with angiotensin-converting enzyme inhibition in patients with congestive heart failure	no				
58	Augmented short- and long-term hemodynamic and hormonal effects of an angiotensin receptor blocker added to angiotensin converting enzyme inhibitor therapy in patients with heart failure	yes	Novartis Pharmaceuticals			
59	Effect of sacubitril/valsartan versus enalapril on glycaemic control in patients with heart failure and diabetes: a post-hoc analysis from the PARADIGM-HF trial	yes	Novartis			
60	Effect of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers on all-cause mortality, cardiovascular deaths, and	yes			grant from the National Basic	

	cardiovascular events in patients with diabetes mellitus: A meta-analysis				Research Program of China and grant from the Zhejiang Provincial Education Departmen t	
61	Addition of angiotensin II receptor blockade to maximal angiotensin-converting enzyme inhibition improves exercise capacity in patients with severe congestive heart failure	no				
62	Effect of enalapril on congestive heart failure treated with diuretics in elderly patients with prior myocardial infarction and normal left ventricular ejection fraction	no				
63	Acute and long-term response to an oral converting-enzyme inhibitor, captopril, in congestive heart failure	no				
64	Clinical outcome with enalapril in symptomatic chronic heart failure; A dose comparison	no				
65	Angiotensin converting enzyme inhibition in patients with congestive heart failure	no				
66	Maximally recommended doses of angiotensin-converting enzyme (ACE) inhibitors do not completely prevent ACE-mediated formation of angiotensin II in chronic heart failure	no				
67	Long-term survival in severe heart failure in patients treated with enalapril. Ten year follow-up of CONSENSUS I	no				
68	Abnormalities of hemorheological, endothelial, and platelet function in patients with chronic heart failure in sinus rhythm: Effects of angiotensin-converting enzyme inhibitor and β-blocker therapy	no				
69	Comparison of the effects of losartan and enalapril on clinical status and exercise performance in patients with moderate or severe chronic heart failure	no				
70	How often are angiotensin II and aldosterone concentrations raised during chronic ACE inhibitor treatment in cardiac failure?	yes			grant from the Scottish Office (acute health care research	

					committee)	
71	Follow-up study of patients randomly allocated ramipril or placebo for heart failure after acute myocardial infarction: AIRE Extension (AIREX) Study	no				
72	Prognostic importance of early worsening renal function after initiation of angiotensin-converting enzyme inhibitor therapy in patients with cardiac dysfunction	yes			grant from the National Institutes of Health	
73	Aliskiren, enalapril, or aliskiren and enalapril in heart failure	yes	Novartis			
74	Effect of direct vasodilation with hydralazine versus angiotensin-converting enzyme inhibition with captopril on mortality in advanced heart failure: The Hy-C trial	no				
75	Angiotensin-converting enzyme inhibitor as a risk factor for the development of anemia, and the impact of incident anemia on mortality in patients with left ventricular dysfunction	no				
76	National patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure	404				
77	National patterns of use and effectiveness of angiotensin-converting enzyme inhibitors in older patients with heart failure and left ventricular systolic dysfunction	no				
78	Spironolactone in congestive heart failure refractory to high-dose loop diuretic and low-dose angiotensin-converting enzyme inhibitor	no				
79	Differential effects of quinaprilat and enalaprilat on endothelial function of conduit arteries in patients with chronic heart failure	yes		supported in part by the Deutsche Forschungsgemeinschaft		
80	IMPROVEMENT OF CHRONIC CONGESTIVE HEART-FAILURE BY ORAL CAPTOPRIL	no				
81	Pharmacogenetic interactions between angiotensin-converting enzyme inhibitor therapy and the angiotensin-converting enzyme deletion polymorphism in patients with congestive heart failure	no				
82	Development of circulatory-renal limitations to angiotensin-converting enzyme inhibitors identifies patients with severe heart failure and early mortality	no				

83	Addition of spironolactone to angiotensin-converting enzyme inhibition in heart failure improves endothelial vasomotor dysfunction: Role of vascular superoxide anion formation and endothelial nitric oxide synthase expression	no				
84	Perindopril for elderly people with chronic heart failure: The PEP-CHF study	yes	support of Servier Laboratories			
85	Effects of enalapril maleate on survival of dogs with naturally acquired heart failure	not availabl e				
86	Acute regional circulatory and renal hemodynamic effects of converting-enzyme inhibition in patients with congestive heart failure	no				
87	Effects of enalapril on mortality in severe congestive heart failure: Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	no				
88	Patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure in two community hospitals	no				
89	Baseline characteristics and treatment of patients in Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in heart failure trial (PARADIGM-HF)	no				
90	Efficacy and safety of high-dose lisinopril in chronic heart failure patients at high cardiovascular risk, including those with diabetes mellitus: Results from the ATLAS trial	yes	grants from AstraZeneca			
91	Enalaprilat augments arterial and cardiopulmonary baroreflex control of sympathetic nerve activity in patients with heart failure	no				
92	Cardiac remodelling in end stage heart failure: Upregulation of matrix metalloproteinase (MMP) irrespective of the underlying disease, and evidence for a direct inhibitory effect of ACE inhibitors on MMP	yes			Bundesmin isterium für Bildung und Forschung, ational Institutes of Health	
93	Failure of aldosterone suppression despite angiotensin-converting enzyme (ACE) inhibitor administration in chronic heart failure is associated with ACE DD genotype	no				
94	Effects of spironolactone on	yes		Northwood		

	endothelial function, vascular angiotensin converting enzyme activity, and other prognostic markers in patients with mild heart failure already taking optimal treatment			Trust		
95	High- versus low-dose ACE inhibition in chronic heart failure: A double- blind, placebo-controlled study of imidapril	no				
96	Heart failure treatment with angiotensin-converting enzyme inhibitors in hospitalized Medicare patients in 10 large states	404				
97	Angiotensin converting enzyme (ACE) and non-ACE dependent angiotensin II generation in resistance arteries from patients with heart failure and coronary heart disease	no				
98	Direct renin inhibition in addition to or as an alternative to angiotensin converting enzyme inhibition in patients with chronic systolic heart failure: Rationale and design of the Aliskiren Trial to Minimize OutcomeS in Patients with HEart failuRE (ATMOSPHERE) study	yes	Novartis Pharma AG			
99	Acute and long-term effects of enalapril on the cardiovascular response to exercise and exercise tolerance in patients with congestive heart failure	no				
100	Lisinopril: A Preliminary Review of its Pharmacodynamic and Pharmacokinetic Properties, and Therapeutic Use in Hypertension and Congestive Heart Failure	no				

Table 10: Total number of papers with and without title funding

Articles that received no funding (n=55)		
Articles that received funding (n=42)		
Pharmaceutical companies	Novartis Pharmaceuticals	10
	Merck Sharp and Dohme Research Laboratories	7
	AstraZeneca	4
	Hoechst	3
	Bristol-Myers Squibb Institute for Pharmaceutical Research	3
	Servier	2
	E R Squibb & Sons Ltd.	1
	Roussel–Uclaf and Knoll	1
	King Pharmaceuticals	1
Non-governmental organisation	National Heart Foundation of	1

	Australia	
	Quebec Heart Foundation	1
	American Heart Association	1
	National Heart Foundation of New Zealand	1
	Deutsche Forschungsgemeinschaft	1
	Northwood Trust	1
government	National Institutes of Health	4
	National Heart, Lung, and Blood Institute	2
	Medical Research Council of Canada	2
	National Health and Medical Research Council of Australia	1
	Canadian Institutes of Health Research	1
	New York State Department of Health	1
	National Basic Research Program of China	1
	Zhejiang Provincial Education Department	1
	acute health care research committee	1
	Bundesministerium für Bildung und Forschung	1
Grants (n=16)		

Table 11: Author's conflict of interest in studies

Rank	Title	Conflict of interest			
		First author	Second author	Third author	Last author
1	Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure	no	no	no	no
2	Effect of Captopril on Mortality and Morbidity in Patients with Left Ventricular Dysfunction after Myocardial Infarction: Results of the Survival and Ventricular Enlargement Trial	no	no	no	no
3	Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	no	no	no	no
4	Effect of Enalapril on Mortality and the Development of Heart Failure in Asymptomatic Patients with Reduced Left Ventricular Ejection Fractions	no	no	no	no
5	Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE study and MICRO-HOPE substudy	no	yes	no	no
6	A randomized trial of the angiotensin-receptor blocker valsartan in chronic heart failure	no	no	no	no
7	Effect of ramipril on mortality and morbidity of survivors of acute myocardial infarction with clinical evidence of heart	no	no	no	no

	failure				
8	Valsartan, Captopril, or Both in Myocardial Infarction Complicated by Heart Failure, Left Ventricular Dysfunction, or Both	yes	yes	yes	yes
9	Effect of losartan compared with captopril on mortality in patients with symptomatic heart failure: Randomised trial - The Losartan Heart Failure Survival Study ELITE II	no	no	no	no
10	Overview of Randomized Trials of Angiotensin-Converting Enzyme Inhibitors on Mortality and Morbidity in Patients With Heart Failure	no	no	no	no
11	Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin-converting-enzyme inhibitors: The CHARM-added trial	yes	yes	yes	yes
12	Randomised trial of losartan versus captopril in patients over 65 with heart failure (Evaluation of Losartan in the Elderly Study, ELITE)	no	no	no	no
13	A clinical trial of the angiotensin-converting–enzyme inhibitor trandolapril in patients with left ventricular dysfunction after myocardial infarction	no	no	no	no
14	Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: Results of prospectively designed overviews of randomised trials	no	no	no	no
15	Long-term ACE-inhibitor therapy in patients with heart failure or left-ventricular dysfunction: A systematic overview of data from individual patients	no	yes	no	no
16	Effects of Enalapril on Mortality in Severe Congestive Heart Failure	no	no	no	no
17	The perindopril in elderly people with chronic heart failure (PEP-CHF) study	yes	yes	yes	yes
18	The effect of the angiotensin-converting⇓enzyme inhibitor zofenopril on mortality and morbidity after anterior myocardial infarction	no	no	no	no
19	Effects of angiotensin-converting enzyme inhibition on the development of the atrial fibrillation substrate in dogs with ventricular tachypacing - Induced congestive heart failure	yes	no	no	no
20	Angiotensin-neprilysin inhibition in acute decompensated heart failure	yes	yes	yes	yes
21	Angiotensin II-forming pathways in normal and failing human hearts	no	no	no	no
22	Enalapril decreases the incidence of atrial fibrillation in patients with left ventricular dysfunction: Insight from the studies of left ventricular dysfunction (SOLVD) trials	yes	no	no	no
23	Prognostic importance of serum sodium concentration and its modification by converting-enzyme inhibition in patients with severe chronic heart failure	no	no	no	no
24	Angiotensin receptor neprilysin inhibition compared with enalapril on the risk of clinical progression in surviving patients with heart failure	yes	yes	yes	yes
25	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dysfunction in patients with heart failure	no	no	no	no
26	Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction	no	no	no	no

27	Effectiveness of Spironolactone added to an angiotensin-converting enzyme inhibitor and a loop diuretic for severe chronic congestive heart failure (The Randomized Aldactone Evaluation Study [RALES])	no	no	no	no
28	Angiotensin-converting-enzyme inhibitors in stable vascular disease without left ventricular systolic dysfunction or heart failure: a combined analysis of three trials	yes	yes	yes	yes
29	Comparison of vasopeptidase inhibitor, omapatrilat, and lisinopril on exercise tolerance and morbidity in patients with heart failure: IMPRESS randomised trial	no	no	no	no
30	Captopril in heart failure. A double blind controlled trial	yes	no	no	no
31	Effects of adding spironolactone to an angiotensin-converting enzyme inhibitor in chronic congestive heart failure secondary to coronary artery disease	no	no	no	no
32	Sustained Effectiveness of Converting-Enzyme Inhibition in Patients with Severe Congestive Heart Failure	no	no	no	no
33	Effect on survival and hospitalization of initiating treatment for chronic heart failure with bisoprolol followed by enalapril, as compared with the opposite sequence: Results of the Randomized Cardiac Insufficiency Bisoprolol Study (CIBIS) III	yes	yes	yes	yes
34	Effects of valsartan on morbidity and mortality in patients with heart failure not receiving angiotensin-converting enzyme inhibitors	no	no	no	no
35	Circulating plasma concentrations of angiotensin-converting enzyme 2 inmen and women with heart failure and effects of renin-angiotensin-aldosterone inhibitors	no	no	yes	no
36	Effect of the angiotensin-receptor-neprilysin inhibitor LCZ696 compared with enalapril on mode of death in heart failure patients	yes	yes	yes	no
37	Effects of the angiotensin converting enzyme inhibitor enalapril on the long-term progression of left ventricular dilatation in patients with asymptomatic systolic dysfunction	no	no	no	no
38	Increased angiotensin-(1-7)-forming activity in failing human heart ventricles: Evidence for upregulation of the angiotensin-converting enzyme homologue ACE2	yes	no	no	no
39	Early prevention of left ventricular dysfunction after myocardial infarction with angiotensin-converting-enzyme inhibition	no	no	no	no
40	Effect of propranolol versus no propranolol on total mortality plus nonfatal myocardial infarction in older patients with prior myocardial infarction, congestive heart failure, and left ventricular ejection fraction ≤40% treated with diuretics plus angiotensin-converting enzyme inhibitors	no	no	no	no
41	Effects of enalapril in heart failure: A double blind study of effects on exercise performance, renal function, hormones, and metabolic state	yes	no	yes	no
42	Immediate and sustained hemodynamic and clinical improvement in chronic heart failure by an oral angiotensin-converting enzyme inhibitor	no	no	no	no
43	Comparison of Captopril and Enalapril in Patients with Severe Chronic Heart Failure	no	no	no	no

44	Enalapril in patients with chronic heart failure: A placebo-controlled, randomized, double-blind study	no	no	no	no
45	Enalapril reduces the incidence of diabetes in patients with chronic heart failure: Insight from the studies of left ventricular dysfunction (SOLVD)	yes	no	no	no
46	Clinical implications of increased plasma angiotensin II despite ACE inhibitor therapy in patients with congestive heart failure	no	no	no	no
47	Counteraction of the vasodilator effects of enalapril by aspirin in severe heart failure	no	no	no	no
48	Risk Related to Pre-Diabetes Mellitus and Diabetes Mellitus in Heart Failure with Reduced Ejection Fraction: Insights from Prospective Comparison of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure Trial	no	no	yes	yes
49	Treatment of Chronic Congestive Heart Failure with Captopril, an Oral Inhibitor of Angiotensin-Converting Enzyme	no	no	no	no
50	Aldosterone escape during angiotensin-converting enzyme inhibitor therapy in chronic heart failure	no	no	no	no
51	Contrasting peripheral short-term and long-term effects of converting enzyme inhibition in patients with congestive heart failure. A double-blind, placebo-controlled trial	no	no	no	no
52	Effect of high- versus low-dose angiotensin converting enzyme inhibition on cytokine levels in chronic heart failure	no	no	no	no
53	Determinants and clinical outcome of uptitration of ACE-inhibitors and beta-blockers in patients with heart failure: A prospective European study	no	no	yes	no
54	Enalapril effects on atrial remodeling and atrial fibrillation in experimental congestive heart failure	no	no	no	no
55	"Escape" of aldosterone production in patients with left ventricular dysfunction treated with an angiotensin converting enzyme inhibitor: Implications for therapy	no	no	no	no
56	Systolic versus diastolic heart failure in community practice: Clinical features, outcomes, and the use of angiotensin-converting enzyme inhibitors	no	no	no	no
57	Sustained augmentation of parasympathetic tone with angiotensin-converting enzyme inhibition in patients with congestive heart failure	no	no	no	no
58	Augmented short- and long-term hemodynamic and hormonal effects of an angiotensin receptor blocker added to angiotensin converting enzyme inhibitor therapy in patients with heart failure	no	no	no	no
59	Effect of sacubitril/valsartan versus enalapril on glycaemic control in patients with heart failure and diabetes: a post-hoc analysis from the PARADIGM-HF trial	no	no	no	no
60	Effect of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers on all-cause mortality, cardiovascular deaths, and cardiovascular events in patients with diabetes mellitus: A meta-analysis	no	no	no	no
61	Addition of angiotensin II receptor blockade to maximal angiotensin- converting enzyme inhibition improves exercise capacity in patients with severe congestive heart failure	no	no	no	no
62	Effect of enalapril on congestive heart failure treated with	no	no	no	no

	diuretics in elderly patients with prior myocardial infarction and normal left ventricular ejection fraction				
63	Acute and long-term response to an oral converting-enzyme inhibitor, captopril, in congestive heart failure	no	no	no	no
64	Clinical outcome with enalapril in symptomatic chronic heart failure; A dose comparison	no	no	no	no
65	Angiotensin converting enzyme inhibition in patients with congestive heart failure	no	no	no	no
66	Maximally recommended doses of angiotensin-converting enzyme (ACE) inhibitors do not completely prevent ACE-mediated formation of angiotensin II in chronic heart failure	no	no	no	no
67	Long-term survival in severe heart failure in patients treated with enalapril. Ten year follow-up of CONSENSUS I	no	no	no	no
68	Abnormalities of hemorheological, endothelial, and platelet function in patients with chronic heart failure in sinus rhythm: Effects of angiotensin-converting enzyme inhibitor and β-blocker therapy	no	no	no	no
69	Comparison of the effects of losartan and enalapril on clinical status and exercise performance in patients with moderate or severe chronic heart failure	no	no	no	no
70	How often are angiotensin II and aldosterone concentrations raised during chronic ACE inhibitor treatment in cardiac failure?	no	no	no	no
71	Follow-up study of patients randomly allocated ramipril or placebo for heart failure after acute myocardial infarction: AIRE Extension (AIREX) Study	no	no	yes	no
72	Prognostic importance of early worsening renal function after initiation of angiotensin-converting enzyme inhibitor therapy in patients with cardiac dysfunction	no	no	no	no
73	Aliskiren, enalapril, or aliskiren and enalapril in heart failure	yes	no	no	no
74	Effect of direct vasodilation with hydralazine versus angiotensin-converting enzyme inhibition with captopril on mortality in advanced heart failure: The Hy-C trial	no	no	no	no
75	Angiotensin-converting enzyme inhibitor as a risk factor for the development of anemia, and the impact of incident anemia on mortality in patients with left ventricular dysfunction	no	no	no	no
76	National patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure				
77	National patterns of use and effectiveness of angiotensin-converting enzyme inhibitors in older patients with heart failure and left ventricular systolic dysfunction	yes	yes	no	no
78	Spironolactone in congestive heart failure refractory to high-dose loop diuretic and low-dose angiotensin-converting enzyme inhibitor	no	no	no	no
79	Differential effects of quinaprilat and enalaprilat on endothelial function of conduit arteries in patients with chronic heart failure	no	yes	no	no
80	IMPROVEMENT OF CHRONIC CONGESTIVE HEART-FAILURE BY ORAL CAPTOPRIL	no	no	no	no
81	Pharmacogenetic interactions between angiotensin-converting enzyme inhibitor therapy and the angiotensin-converting enzyme deletion polymorphism in patients with congestive heart failure	no	no	no	no

82	Development of circulatory-renal limitations to angiotensin-converting enzyme inhibitors identifies patients with severe heart failure and early mortality	no	no	no	no
83	Addition of spironolactone to angiotensin-converting enzyme inhibition in heart failure improves endothelial vasomotor dysfunction: Role of vascular superoxide anion formation and endothelial nitric oxide synthase expression	no	no	no	no
84	Perindopril for elderly people with chronic heart failure: The PEP-CHF study	no	no	no	no
85	Effects of enalapril maleate on survival of dogs with naturally acquired heart failure				
86	Acute regional circulatory and renal hemodynamic effects of converting-enzyme inhibition in patients with congestive heart failure	no	no	no	no
87	Effects of enalapril on mortality in severe congestive heart failure: Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS)	no	no	no	no
88	Patterns of angiotensin-converting enzyme inhibitor use in congestive heart failure in two community hospitals	no	no	no	no
89	Baseline characteristics and treatment of patients in Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in heart failure trial (PARADIGM-HF)	yes	yes	yes	yes
90	Efficacy and safety of high-dose lisinopril in chronic heart failure patients at high cardiovascular risk, including those with diabetes mellitus: Results from the ATLAS trial	no	no	no	no
91	Enalaprilat augments arterial and cardiopulmonary baroreflex control of sympathetic nerve activity in patients with heart failure	no	no	no	no
92	Cardiac remodelling in end stage heart failure: Upregulation of matrix metalloproteinase (MMP) irrespective of the underlying disease, and evidence for a direct inhibitory effect of ACE inhibitors on MMP	no	no	no	no
93	Failure of aldosterone suppression despite angiotensin-converting enzyme (ACE) inhibitor administration in chronic heart failure is associated with ACE DD genotype	no	no	no	no
94	Effects of spironolactone on endothelial function, vascular angiotensin converting enzyme activity, and other prognostic markers in patients with mild heart failure already taking optimal treatment	no	no	no	no
95	High- versus low-dose ACE inhibition in chronic heart failure: A double- blind, placebo-controlled study of imidapril	no	no	no	no
96	Heart failure treatment with angiotensin-converting enzyme inhibitors in hospitalized Medicare patients in 10 large states				
97	Angiotensin converting enzyme (ACE) and non-ACE dependent angiotensin II generation in resistance arteries from patients with heart failure and coronary heart disease	no	no	no	no
98	Direct renin inhibition in addition to or as an alternative to angiotensin converting enzyme inhibition in patients with chronic systolic heart failure: Rationale and design of the Aliskiren Trial to Minimize OutcomeS in Patients with HEart failuRE (ATMOSPHERE) study	no	no	no	no
99	Acute and long-term effects of enalapril on the	no	no	no	no

	cardiovascular response to exercise and exercise tolerance in patients with congestive heart failure				
100	Lisinopril: A Preliminary Review of its Pharmacodynamic and Pharmacokinetic Properties, and Therapeutic Use in Hypertension and Congestive Heart Failure	no	no	no	no

Table 12: Total number of authors with and without conflict of interest

No. of authors with no conflict of interest (n=335)	
No. of authors with conflict of interest (n=53)	
First Author	17
Second Author	13
Third Author	14
Last Author	9

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