

# Chinese Research on Myocardial Infarction – A Scientometric Study

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## ABSTRACT

A Myocardial Infarction (MI), commonly known as a heart attack, occurs when blood flow decreases or stops to the coronary artery of the heart, causing damage to the heart muscle. This investigation is a pioneering effort to depict the scientific output of myocardial infarction research especially in China using the data downloaded from Scopus database for a period from 2001 to 2020. The study proved that Chinese scholars are interested in collaborative research rather than solo research. The study deviates Bradford's law of scattering. The highest productive journal in this field, as chosen by Chinese scholars is Chinese Medical Journal followed by International Journal of Cardiology (United States) and Medicine (United States). Wang, Y ranks first with 922 publications followed by Zang, Y and Li, Y having 849 and 739 publications respectively. More than one third of the references are of less than 5 years old.

**Keywords:** Myocardial infarction, Scientometrics, China, Heart Attack, Cardiovascular diseases.

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## INTRODUCTION

A Myocardial Infarction (MI), commonly known as a heart attack, occurs when blood flow decreases or stops to the coronary artery of the heart, causing damage to the heart muscle. The most common symptom is chest pain or discomfort which may travel into the shoulder, arm, back, neck or jaw. Cardiovascular diseases (CVDs) are the leading cause of death globally, taking an estimated 17.9 million lives each year. (WHO).<sup>1</sup> Approximately 1.5 million cases of MI occur annually in the United States. More than four out of five CVD deaths are due to heart attacks and strokes, and one third of these deaths occur prematurely in people under 70 years of age. Joshua Chadwick Jayaraj *et al.*<sup>2</sup> found that although the incidence of MI is decreased in the industrialized nations partly because of improved health systems and implementation of effective public health strategies, nevertheless the rates are surging in the developing countries such as South Asia, parts of Latin America, and Eastern Europe.

## Previous studies

Zhou, H *et al.*<sup>3</sup> evaluated the global scientific output of gene research of myocardial infarction for the period from 2001 to 2015, using bibliometric methods. The data for the research

was downloaded from Web of Science. It was found that there were 1,853 publications on gene research of myocardial research from 2001 to 2015, and the annual publication number increased with time. The journal Circulation published the highest number of articles. United States ranked highest in the countries with most publications, and the leading institute was Harvard University. Relevant publications were mainly in the field of Cardiovascular system cardiology. Donatella Ugolini *et al.*<sup>4</sup> analysed scientific production in the field of cerebrovascular and cardiovascular disease (CCD) rehabilitation. The total records downloaded from Pubmed for the period from 1967 to 2008 was 10379. The growth rate was 8.6 times in 40 years. The overall scientific production in the field of CCD rehabilitation showed a steep growth in the last decade, especially because of cerebrovascular research. The European Union and the United States contributed 3 of every 4 articles in the field, although some Asian countries showed promising performance. Ma Dan *et al.*<sup>5</sup> found that research on exosomes is flourishing in the cardiovascular medicine. Regenerative medicine, exosome engineering, delivery vehicles, and biomarkers will likely become the focus of future research. Sadeer Al-Kindi *et al.*<sup>6</sup> found that Middle Eastern countries produced only 3% of the total number of CVD research articles in the world. However, the overall trend showed an increase in the number of articles over the years, mainly from Turkey and Iran. Within this region, the ratio of CVD to non-CVD publications was highest in Qatar (0.23). Lebanon ranked first in the number of CVD publications per million persons (PMP) averaging 194.2 publications PMP. A search for research papers in the field of myocardial infarction



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shows that very few studies are available and most of the studies are in the field of bibliometric analysis in cardiovascular diseases. Majority of the studies were based on PubMed or Web of Science databases. Hence it is proposed to conduct an analysis of research literature on Myocardial infarction using the data available in Scopus database with special reference to China.

### Objectives

This paper attempts to answer the following research questions.

RQ1: What is the trend of myocardial research in China?

RQ2. What is the pattern of authorship?

RQ3. Who are the high productive authors?

RQ4. What is the referencing pattern of scholars in this field?

### Methods

The data for this investigation was downloaded from Scopus data covering the years from 2001 to 2020 using author keyword “Myocardial Infarction”. 14865 bibliographic records were downloaded and the data in the text format with tags were converted into MS Access database using Visual Basic 6. Necessary tables are generated using SQL.

## ANALYSIS AND DISCUSSION

The research in the field of myocardial infarction shows a growth from 2001 to 2020 except a slight decline in the year 2007. 2004

Trend of research in myocardial research in China.			
Year	Publications	Percent	Growth Rate
2001	68	0.46	
2002	101	0.68	0.49
2003	129	0.87	0.28
2004	211	1.42	0.64
2005	293	1.97	0.39
2006	404	2.72	0.38
2007	386	2.60	-0.04
2008	466	3.13	0.21
2009	534	3.59	0.15
2010	545	3.67	0.02
2011	634	4.27	0.16
2012	719	4.84	0.13
2013	871	5.86	0.21
2014	979	6.59	0.12
2015	1191	8.01	0.22
2016	1264	8.50	0.06
2017	1315	8.85	0.04
2018	1461	9.83	0.11
2019	1621	10.90	0.11
2020	1673	11.25	0.03
	14865	100.00	

Authorship pattern analysis.		
Number of Authors	Publications	Percent
One author	134	0.90
Two authors	562	3.78
Three authors	1276	8.58
Four authors	1616	10.87
Five authors	1920	12.92
Six authors	2067	13.91
Seven authors	1784	12.00
Eight authors	1384	9.31
Nine authors	1052	7.08
Ten authors	882	5.93
Eleven authors	560	3.77
Twelve authors	432	2.91
Thirteen authors	265	1.78
Fourteen Authors	188	1.26
Fifteen authors	150	1.01
Sixteen authors	122	0.82
Seventeen author	77	0.52
Eighteen authors	62	0.42
Nineteen authors	56	0.38
Twenty authors	45	0.30
More than twenty authors	231	1.55
	14865	100.00

marks the highest growth rate (0.64) and the year 2020 has the least growth rate (0.03). However, it is found that from 2011 to 2020 the research productivity has growth to 218 folds.

The authorship pattern shows that there are very negligible percentage of publications OFS of solo research (0.90%). As the number of authors increases from two to six, the number of publications also increases. The inference is that the optimum number of scholars in collaborative research is six. Here it is to be noted that, nearly 85 per cent of publications are the results of collaborative research by less than ten authors.

The total number of journals that have contributed to myocardial infarction research is 1531 of which 36 are core in nature. The highest productive journal in this field, as chosen by Chinese scholars is Chinese Medical Journal followed by International Journal of Cardiology (United States) and Medicine (United States). An application of Bradford's law of scattering to this field shows that the three zones are in the ratio 35:121:1375 = 1: 3.56: 38.28 which is not in the ratio 1:n:n<sup>2</sup>. Hence the study deviates Bradford's law of scattering.

Among the total publications, 23.10 per cent of the papers do not receive any citation at all and more than one fourth of the papers

Core journals.	
Journals	Publications
Chinese Medical Journal	534
International Journal of Cardiology	390
Medicine (United States)	340
Chinese Journal of Emergency Medicine	232
BMC Cardiovascular Disorders	190
National Medical Journal of China	187
International Journal of Clinical and Experimental Medicine	173
Chinese Journal of Cardiology	172
Experimental and Therapeutic Medicine	170
Zhonghua xin xue guan bing za zhi [Chinese journal of cardiovascular diseases]	154
Molecular Medicine Reports	147
European Review for Medical and Pharmacological Sciences	135
Medical Science Monitor	130
Zhonghua Wei Zhong Bing Ji Jiu Yi Xue	114
Journal of Geriatric Cardiology	114
Coronary Artery Disease	112
Journal of Cellular and Molecular Medicine	112
Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban	106
Zhonghua xin xue guan bing za zhi	103
Journal of International Medical Research	103
American Journal of Emergency Medicine	102
Cellular Physiology and Biochemistry	98
Clinical Cardiology	97
International Heart Journal	92
Chinese Journal of Clinical Rehabilitation	88
Journal of Cardiovascular Electrophysiology	85
Chinese Journal of Medical Imaging Technology	84
BioMed Research International	79
Chinese Critical Care Medicine	79
Journal of the American Heart Association	77
Circulation	77
Biomedicine and Pharmacotherapy	75
Catheterization and Cardiovascular Interventions	75
Resuscitation	72
Heart Rhythm	72

Bradford's law of scattering.		
Zones	No of journals	No of papers
Zone 1	35	4970
Zone 2	121	4958
Zone 3	1375	4937

Number of citations.		
Citations	Publications	Per cent
0	3434	23.10
1	1703	11.46
2	1203	8.09
3	944	6.35
4	755	5.08
5	645	4.34
6	530	3.57
7	452	3.04
8	387	2.60
9	343	2.31
10	303	2.04
More than 10 citations	4166	28.03
	14865	100.00

Number of cited references.		
References	Publications	Per cent
0	1120	7.53
1	84	0.57
2	82	0.55
3	109	0.73
4	132	0.89
5	190	1.28
6	179	1.20
7	209	1.41
8	223	1.50
9	255	1.72
10	311	2.09
11-20	2792	18.78
21-30	3787	25.48
31-40	2872	19.32
41-50	1331	8.95
More than 50	1189	8.00
	14865	100.00

Age of the references.			
Age	Count	Percent	Cumulative
0	7359	1.80	1.8
1	31078	7.61	9.41
2	40271	9.86	19.26
3	38885	9.52	28.78
4	34910	8.54	37.32
5	31752	7.77	45.09
6	27701	6.78	51.87
7	24753	6.06	57.93
8	21376	5.23	63.16
9	18579	4.55	67.70
10	16515	4.04	71.75
11	14231	3.48	75.23
12	12276	3.00	78.23
13	10726	2.62	80.86
14	9244	2.26	83.12
15	8161	2.00	85.12
16	6994	1.71	86.83
17	5811	1.42	88.25
18	5027	1.23	89.48
19	4126	1.01	90.49
20	3398	0.83	91.32
More than 20 years	23587	5.77	97.09
Year not available	11872	2.91	100.00
	408632	100.00	

High Prolific Authors.	
Author Name	Total Count
Wang, Y.	922
Zhang, Y.	849
Li, Y.	737
Li, J.	668
Wang, X.	644
Liu, Y.	632
Wang, J.	622
Li, X.	563
Zhang, J.	544
Wang, L.	502

have citation count above 10. The interesting fact is that nearly 50 per cent of the papers have one to ten citations.

Cited references are the bibliographic details of materials consulted for research. The more the number of references, the high will be standard of the research papers. The research shows that 7.53 per cent of the papers do not have references and 11.93 per cent of the papers have less than 10 references. Nearly one fourth of the papers (25.48%) have 21-30 references. Also, 8.00 per cent of the papers have more than 50 reference.

The study shows that 408632 are appended to 14865 publications in myocardial infarction research in China. That is, on an average there are 27.5 references to a paper. Among the references, 11872 (2.91%) papers do not have the year in the bibliographic data. The age of the reference shows that 1.8 per cent of the reference are current in nature i.e 1.86 per cent of the references are of current ones (reference belonging to the same year in which the paper is published. B.E. Turvey, J.L. Freeman<sup>7</sup> notes that recency effect is a cognitive bias in which those items, ideas, or arguments that came last are remembered more clearly than those that came first. Here the recency effect of referencing is the quantum of references which are current (5 years old). In this investigation more than one-third (37.32%) of the references has recency effect. Also, it is observed that more than 70 per cent of the references are 10 years old.

The total number of Chinese scholars who have contributed to Myocardial research is 34343 of which Wang, Y ranks first with 922 publications followed by Zang, Y and Li, Y having 849 and 739 publications respectively. Here it is to be noted that 69.5 per cent ( $n = 23889$ ) of the authors have contributed only one paper. Also, except Zang, J and Wang, L, the other top ten ranked authors have not published any paper without collaborative effort.

## FINDINGS AND CONCLUSION

This investigation is a pioneering effort to depict the scientific output of myocardial infarction research especially in China. While analyzing the research trend, the study shows the authorship pattern, referencing pattern and the high prolific authors in this field. The study proved that Chinese scholars are interested in collaborative research rather than solo research. The study deviates Bradford's law of scattering. The highest productive journal in this field, as chosen by Chinese scholars is Chinese Medical Journal followed by International Journal of Cardiology (United States) and Medicine (United States). Wang, Y ranks first with 922 publications followed by Zang, Y and Li, Y having 849 and 739 publications respectively. More than one third of the references are of less than 5 years old.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## REFERENCES

1. Available from: [https://www.who.int/health-topics/cardiovascular-diseases#tab\\_1](https://www.who.int/health-topics/cardiovascular-diseases#tab_1) [cited 6/12/2021].

2. Jayaraj Joshua Chadwick, *et al.* Epidemiology of myocardial infarction. In: Pamukçu B, editor. Available from: <https://www.intechopen.com/chapters/59778> Myocardial infarction; 2018. doi: 10.5772/intechopen.74768.
3. Zhou Huaqiang, Tan Wulin, Qiu Zeting, Song Yiyan, Gao Shaowei. A bibliometric analysis in gene research of myocardial infarction from 2001 to 2015. *PeerJ*. 2018;6:e4354. doi: 10.7717/peerj.4354, PMID 29456889.
4. Ugolini Donatella, Neri Monica, Cesario Alfredo, Marazzi Giuseppe, Milazzo Daniele, Volterrani Maurizio, *et al.* Bibliometric Analysis of Literature in Cerebrovascular and cardiovascular Diseases Rehabilitation: Growing Numbers, Reducing Impact Factor. *Arch Phys Med Rehabil*. 2013;94(2):324-31. doi: 10.1016/j.apmr.2012.08.205, PMID 22922328.
5. Dan Ma, *et al.* A bibliometric analysis of exosomes in cardiovascular diseases from 2001 to 2021. *Front Cardiovasc Med*. 2021;8:999.
6. Al-Kindi Sadeer, Al-Juhaishi Taha, Haddad Fadi, Taheri Shahrada, Abi Khalil Charbel. Cardiovascular disease research activity in the Middle East: A bibliometric analysis. *Ther Adv Cardiovasc Dis*. 2015;9(3):70-6. doi: 10.1177/1753944715578585. PMID 25801472.
7. Turvey BE, Freeman JL. Jury Psychology. In: *Encyclopedia of human behavior*. 2<sup>nd</sup> ed; 2012.

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