



SCIENTIFIC RESEARCH OUTPUT ON HEART ATTACK DURING 2011 TO 2020 IN SAARC COUNTRIES: A SCIENTOMETRICS ANALYSIS

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ABSTRACT

The study examined 539 papers related to the publications of SAARC Countries on heart attack indexed in the Scopus databases during 2011-2020. The world heart attack output (3854 publications) was formed from several countries. Among the SAARC, India is the highest contributor with 473 (87.76%) publications of which publications were published in the form of Article i.e. 2454 (63.67%), with citations with 33414(64.16%), citation per papers with 13.62 and h-index with 76.

The authorship pattern most of the papers were published by the collaboration of single authors i.e. 676, The Collaboration Co-efficient analysis of India an average CC and MCC are the follow by is 0.618, 0.680 and DC is 0.40. The Collaboration Co-efficient analysis of Pakistan an average number of CC is 0.786, MCC is 1.246 and DC is 1.00. The Collaboration Co-efficient analysis of Bangladesh an average number of CC is 0.487, MCC is 0.608 and DC is 0.675. The Collaboration Co-efficient analysis of Sri Lanka an average number of CC is 0.247, MCC is 0.00 and DC is 0.30. The Collaboration Co-efficient analysis of Nepal an average number of CC is 0.800, MCC is 0.00 and DC is 0.20. The India has recorded an overall activity index of 949.58. India's highest activity index came in 2019 (168.82) and the lowest found in 2011 (35.32).

KEYWORDS: Scientometrics, Heart attack, SAARC, Research trends, Collaborative co-efficient, Modified collaborative co-efficient, Degree of collaboration.

INTRODUCTION

The heart is the governing organ of the body, it is essential to survive; the heart is responsible for pumping oxygen-rich blood throughout the body it is the main part of the circulator. If the heart is not functioning correctly, it may cause some diseases, sometimes it takes to severe conditions and finally to death. There are many types of Heart diseases, likely coronary heart disease, heart attack, heart failure, and congenital heart disease, which is the leading cause of death. Coronary which is a heart disease that happens if heart's blood supply is blocked or disturbed by a build-up of fatty materials in the coronary arteries. Heart attack will happens if the blood clot blocks blood movement to the heart then tissue loses oxygen without blood they dies. If the heart cannot pump the heart failure can occur or fill sufficiently.

Even through heart disease are in multiple forms research articles published and focused mostly on Heart Attack and Heart Failure which is the most common all over the world. Research article is aimed to explain about the heart attacks, heart failure and what reasons these diseases, what systems these diseases take, and what can be plan to treat these diseases when they happen and also they stated how to prevent from the heart diseases and also provided a discussion of anticipatory steps to decrease the chances of taking to deal with heart disease.

People who are having heavy weight are more possible to have high blood pressure which can be said as Obesity, this may increases the overall workload of Heart. High Cholesterol type of fat molecule, is an essential part of a healthy body. Too much cholesterol in blood puts at increased risk of heart disease. Smoking raises blood pressure and clot the blood very easily and it is a major risk factor for heart attacks. Diabetes persons can affect heart disease while compare to normal persons. A diabetic person's chance of growing coronary heart disorder is equal to the chance of someone who has had a preceding coronary heart attack. Other Factors depression, stress, ingesting too ample alcohol, and feature all been associated with cardiovascular disorder.^[1] This study is about heart attack or heart failures research articles published by the SAARC countries in journals from 2011 to 2020.

Scientometric Study

Scientometric study is to measure researcher's performance as well as the publications of the researcher. In the last few decades there is major changes in the research activities and developed as a reputable research in the subject discipline of "Library and Information Science". The scientific literature study has a long history seeing back to the early decades of the earlier century. However, the term bibliometrics first appeared in print (Pritchard, 1969)^[2] so despite in the number of research literature in this area it was not until 1969, that Definition of bibliometric was "application of mathematical and statistical methods to books and other media of communication", particularly in North America, the term was quickly adopted and used (Wilson, 1999)^[3] At the equal time, coined the time period scientometrics changed into coined with the aid of using (Nalimov and Mulchenko 1969)^[4] to refer to "the utility of quantitative techniques which might be handling the evaluation of technology regarded as an statistics process". In Europe this time period changed into extensively utilized in contrast, (Wolfram, 2003).^[5]

REVIEW OF LITERATURE

Nishavathi & Jeysankar (2020)^[6] analyzed the study of International Collaborative Publications of Social Network by All India Institute of Medical Sciences, India. Scientometrics measures were applied to find the growth of collaborative publications in global level and other related measure like collaborative, and authorship pattern. Scopus database were used to retrieve the records for this study. Total 19,622 records were downloaded for this study. In total 11 All India Institute of Medical Sciences which are functioning in India were taken for a period of ten years i.e., from 2009 to 2018. The average productivity for the year 2014-2018 is 12.32, while compare to the year 2009-2013 which is 7.68%, it shows that the productivity is increasing and also the results identified 2018 year is most productive year with the cumulative output 14.95%. This study shows that 4 to 10 authors of AIMS contributed more than 60% publications. United States and United Kingdom are the most collaborative countries.

Somesh Rai, et.al (2019)^[7] evaluated the Global Research Trend on Cyber Security: A Scientometric Analysis, the data was retrieved from the Scopus database. The study period taken for this cyber security analysis is from 2001 to 2018 and the articles published is 2720. The year 2018 shows the highest number of articles published with 17.9% from over all data. AGR lowest in the year 2008 and in the year 2018 RGR has been decreasing exponentially,

3.51 is the highest value in doubling time. United States stands first in top contribution of publications with 1078 articles and single author publication also shows in increasing trend. In the year 2012, 2720 papers were cited which has maximum number of citations followed by the year 2013 with 2299 citations. Highest number of research publications were funded by United States with 49 publication out of 119 total funded publications.

Siva et.al (2019)^[8] examined Global Research Publications on Hepatitis C from SCOPUS Database (2009-2018): A Scientometric Study, There are 59926 research publications are identified in hepatitis C during the study period, and a maximum of 6547 (10.93%) publications are contributed in the year 2015. The RGR has been decreasing trend from (0.71) in 2009 to (0.10) in 2018. Correspondingly the doubling time (Dt) has been increasing from 0.98 in 2010 to 7.28 in 2018. a maximum of 41141 (68.65%) research publications are contributed by article. The highest contribution share of 18160 (23.10%) publications with 460751 citations, CPP is 25.37 and RCI is 2.12 by the United States and expect Egypt top 15 most productive countries relative citation index is more than the world average. the study it is identified that Zeuzem S., Germany contributed a maximum of 355 (11.56%) publications with 28757(23.95%) citations, citation per paper is 81.01, h-index is 73, and relative citation index is 2.07. the maximum of 1443 (2.39%) publications in the journal of Plos One and the institution INSERM, France is 1826 (17.35%) publications with 55515 (14.91%) citations, 30.40 CPP, h-index is 104 and RCI is 0.86.

Sivasamy & Vivekanandhan(2020)^[9] Analysis of Leprosy Research Publications Using Scientometrics The leprosy research articles are contributed in the SCOPUS database for the selected ten-year study period from 2009 to 2018, with 6266 research publications and a maximum of 675(10.77 percent) research publications in the year 2015. The relative growth rate has fluctuated between 0.696 in 2010 and a low of 0.11 in 2018, indicating a downward trend. When you double time values simultaneously, you got 1.00 in 2010 and 6.23 in 2018. Sarno, E.N., with the highest-ranked authors, contributes a maximum of 99 (1.58 percent) research articles, while single authors contribute a maximum of 1069 (17.06 percent). On average, the degree of collaboration is 0.83, and a maximum of 67.32% of research publications are articles. The top ten institutions were 1152 (18.38%) research publications; Fundacao Oswaldo Cruz from Brazil is the most productive author with 232 (3.70%) publications. India is the most significant contributor, with 1522 (24.29%) leprosy research publications.

Ravichandran & Vivekanandhan (2020)^[10] analyzed the scientometric study of Solid Waste Management Research Publications during the year from 2010 to 2019 using SCOPUS Database, 5198 publications in solid waste management research were identified in the 10 years study periods, in the year 2019, 694 research publications were made which is the highest contribution while compare to other years, in the 10 years of publication more than three fourth of the publications (3907) were articles and the most contributed author is Huang with 43 research publications. Three authors contributed maximum number of publications (23.6%) and 0.88 is the average degree of collaboration. In the year 2011 and 2019 the RGR (Relative Growth Rate) is 0.63 and 0.14 respectively and 1.10 and 4.84 is the doubling time for the years 2011 and 2019. The paper published by Guerrero L.A., Maas G., Hogland W. in the year 2013 is the highly cited paper with 630 citations and the title of the paper is Solid waste management challenge for cities in developing countries.

RESEARCH METHODS

The global publication data of five SAARC Countries in heart attack has been retrieved from the Scopus database for the last 10 years (2011-2020). A keyword “heart attack” was used in. (TITLE-ABS-KEY ("Heart Attack") AND PUBYEAR > 2010 AND PUBYEAR < 2021). Data extracted were saved into text format files for further analysis a total of 539 records were retrieved as a research output of five SAARC Countries. For analyzing data, Bib excel and MS-Excel were used the data was collected for this study is 13.02.2021. The collected data were analyzed using micro soft excel worksheet.

Year-wise growth of Heart Attack output in SAARC

Table 1: Year-wise growth of Heart Attack output in SAARC.

Years	India	Pakistan	Bangladesh	Sri Lanka	Nepal	Total SAARC
2011	14	3	0	0	0	17
2012	21	2	0	0	0	23
2013	24	2	1	0	1	28
2014	31	2	3	0	0	36
2015	28	2	0	0	1	31
2016	54	2	4	1	1	62
2017	55	1	4	1	0	61
2018	71	6	3	0	0	80
2019	98	6	10	1	0	115
2020	77	7	2	0	0	86
Total	473	33	27	3	3	539
% Out of 539	87.76	6.12	5.01	0.56	0.56	100.00

Table 1 shows the world has published 3854 publications in heart attack during 2011-2020, out of which, the total research output of five SAARC Countries amounted to 539 publications. Among five SAARC Countries, India is the highest contributor with 473 (87.76%) publications; followed by Pakistan with 33 (6.12%), Bangladesh with 27 (5.01%), Sri Lanka with 3 (0.56%) and Nepal 3 with (0.56%). The five SAARC Countries showed the linear growth rate in heart attack research output during the study period. It shows that India has the highest research output in 2019 whereas India, Bangladesh in 2019, Pakistan 2020.

Document type of Heart Attack research in Global

Table 2: Document type of Heart Attack research in Global.

S.No	Document type	Record	%	Citation	%	CPP	h-Index
1	Article	2454	63.67	33414	64.16	13.62	76
2	Conference Paper	504	13.08	2563	4.92	5.09	21
3	Review	433	11.24	13345	25.62	30.82	52
4	Book Chapter	203	5.27	373	0.72	1.84	9
5	Note	133	3.45	178	0.34	1.34	5
6	Short Survey	37	0.96	164	0.31	4.43	7
7	Editorial	35	0.91	57	0.11	1.63	3
8	Book	20	0.52	1929	3.70	96.45	6
9	Letter	20	0.52	53	0.10	2.65	4
10	Conference Review	7	0.18	1	0.00	0.14	1
11	Erratum	6	0.16	1	0.00	0.17	1
12	Data Paper	1	0.03	1	0.00	1.00	1
13	Undefined	1	0.03	1	0.00	1.00	1
	Total	3854	100.00	52080	100.00		

Table 2 shows that the document type distribution of Five SAARC Countries and its contribution to heart attack research. It shows nine document types such as Article, conference paper, reviews, book chapter, note, short survey, Editorial, book, letter, conference review, erratum, data paper, undefined, Article; conference paper, and review. Among them the highest publications were published in the form of Article with 2454 (63.67%), citations with 33414(64.16%), citation per papers with 13.62 and h-index with 76; followed by conference paper 504(13.08%), citations 2563(4.92%), citation per papers 5.09 and h-index with 21. The lowest publication was found in conference review, erratum, data paper, and undefined with (0.18%), (0.16%), (0.03%), (0.03%) a citation with 1, citation per papers with 0.14, 0.17, 1.00, 1.00 and h-index is 1.

Authorship pattern of Heart Attack in Global

Table 3: Authorship pattern of Heart Attack in Global.

Authorship Pattern													
Years	1	2	3	4	5	6	7	8	9	10	>10	Total	%
2011	90	57	48	36	21	25	12	7	5	4	18	323	8.38
2012	84	65	50	40	39	25	15	6	11	6	12	353	9.16
2013	89	40	55	47	26	26	15	7	4	11	17	337	8.74
2014	90	74	46	43	34	24	19	13	11	9	16	379	9.83
2015	54	67	57	41	37	20	10	11	12	7	18	334	8.67
2016	70	53	48	62	35	30	19	14	10	15	33	389	10.09
2017	62	69	71	61	36	20	20	13	8	4	26	390	10.12
2018	61	63	81	67	29	36	15	11	10	9	24	406	10.53
2019	37	78	104	79	46	31	26	17	20	4	31	473	12.27
2020	39	80	74	71	61	36	27	20	9	11	42	470	12.20
Total	676	646	634	547	364	273	178	119	100	80	237	3854	100.00
%	17.54	16.76	16.45	14.19	9.44	7.08	4.62	3.09	2.59	2.08	6.15	100.00	

Table 3 indicates the authorship pattern on heart attack research of five SAARC Countries. The highest number of the papers was published by single authors i.e.676; followed by two authors i.e.646, three authors with 634, four authors with 547, five authors with 364,six authors with 273, more than ten authors with 237, seven authors with 178, eight author with 119, nine authors with 100, respectively. The least number of papers was published by a ten author with i.e.80. Table 4 shows that the Collaboration Coefficient Analysis of India. Among the five SAARC Countries, India has the highest publication records of 476.

Degree of collaboration

The relationship between single author and multi author contributions is Degree of collaboration. “The degree of collaboration is calculated by the **Subramanian (1983)**^[11] formula”, and used by **Jeyashankar (2013)**^[12] **Sivasamy (2020)**.^[13] **Ravichandran (2021)**^[14]

$$DC = \frac{N_m}{(N_m + N_s)}$$

Where DC = Degree of Collaboration

N_m = Number of Multi authored publications

N_s = Number of single authored publications

Collaborative of Co-efficient (CC)

The pattern of co-authorship collaboration among the authors can be measured with the following formula suggested by **Ajiferuke, et al. (1988)**^[15]

$$CC = 1 - \left[\sum_{j=0}^k \left(\frac{1}{j} \right) \times F_j / N \right]$$

Whereas,

F_j = Number of publications with j author papers

N = Total number of the research publications and

k = the greatest number of authors/ paper in the given field

Modified Collaboration Co-efficient

The (MCC) modified collaboration coefficient counted by the formula which is suggested by (Savanur and Srikanth, 2010)^[16]

Which is given below:

Where,

$$MCC = \frac{N}{N-1} \left[1 - \frac{\sum_{j=1}^k jf_j}{N} \right]$$

j = the number authors in an article i.e. 1, 2, 3.....

F_j = the number of j authored articles

N = the total number of articles published in a year, and

A = the total number of authors per articles

Collaboration Co-efficient analysis of India

Table 4: Collaboration Co-efficient analysis of India.

Authorship Pattern									
Years	1	2	3	4	5	>5	CC	MCC	DC
2011	0	6	2	2	1	3	0.65	0.70	1.00
2012	1	10	3	4	1	2	0.59	0.62	2.00
2013	5	3	6	6	2	2	0.55	0.58	6.00
2014	5	10	3	6	3	4	0.56	0.57	6.00
2015	2	8	6	5	5	2	0.62	0.65	3.00
2016	5	8	10	11	9	11	0.65	0.67	6.00
2017	3	17	14	7	4	10	0.63	0.64	4.00
2018	2	19	16	16	6	12	0.66	0.67	3.00
2019	3	35	28	20	6	6	0.62	0.63	4.00
2020	4	25	15	13	10	13	0.64	0.65	5.00
Total	30	141	103	90	47	65	6.18	6.38	40.00

CC= Collaboration Co-efficient; MCC= Modified Collaborative Coefficient; DC= Degree of Collaboration

Table 4 India's author collaboration implies that the multi-authored contributed the highest number of papers i.e.476; followed by two authors with 141, three authors with 103, four authors with 90, more than five authors with 65, five authors with 47, single authors with 30. And the least number of publications was contributed by a single author. The average CC and MCC are the same as 0.618, 0.638 and DC is 0.40. The highest CC of 0.66 and MCC of 0.70 is identified in 2018, 2011 and the lowest of CC is 0.55 in 2013 and MCC is 0.57 in 2014.

Collaboration Coefficient analysis of Pakistan

Table 5: Collaboration Co-efficient analysis of Pakistan.

Authorship Pattern									
Years	1	2	3	4	5	>5	CC	MCC	DC
2011	0	0	0	0	0	2	0.83	1.67	1.00
2012	0	0	1	0	0	1	0.75	1.50	1.00
2013	0	0	0	1	0	1	0.79	1.58	1.00
2014	0	0	0	0	1	1	0.82	1.63	1.00
2015	0	0	0	0	1	1	0.82	1.63	1.00
2016	0	0	0	0	0	2	0.83	1.67	1.00
2017	0	0	1	0	0	0	0.67	0.00	1.00
2018	0	0	1	2	2	1	0.77	0.92	1.00
2019	0	0	1	2	2	1	0.77	0.92	1.00
2020	0	0	0	1	1	6	0.82	0.94	1.00
Total	0	0	4	6	7	16	7.86	12.46	10.00

CC= Collaboration Co-efficient; MCC= Modified Collaborative Coefficient; DC= Degree of Collaboration.

Table 5 represents the author's collaboration analysis of Pakistan. A total of 33 records were published. The contribution was mostly in the form of multi-authored publications with 33; followed by more than five authors with 16 and five authors with 7, four authors with 6, three authors with 4. The least publication was by a single author and two authors. The average number of CC is 0.786, MCC is 1.246 and DC is 1.00. The highest CC of 0.83 is found in 2011, 2016 and the lowest is 0.77 in 2018, 2019. The highest MCC is 1.67 in 2011, 2016 and the lowest of 0.00 in 2017.

Collaboration Co-efficient analysis of Bangladesh

Table 6: Collaboration Co-efficient analysis of Bangladesh.

Authorship Pattern									
Years	1	2	3	4	5	>5	CC	MCC	DC
2011	0	0	0	0	0	0	0.00	0.00	0.00
2012	0	0	0	0	0	0	0.00	0.00	0.00
2013	0	0	0	1	0	0	0.75	0.00	1.00
2014	0	2	0	0	0	1	0.61	0.92	1.00
2015	0	0	0	0	0	0	0.00	0.00	0.00
2016	0	1	0	0	0	3	0.75	1.00	1.00
2017	1	0	0	1	1	1	0.60	0.79	0.75
2018	0	1	1	0	1	0	0.66	0.98	1.00
2019	0	0	6	1	2	1	0.72	0.80	1.00
2020	0	0	0	1	0	1	0.79	1.58	1.00
Total	1	4	7	4	4	7	4.87	6.08	6.75

CC= Collaboration Co-efficient; MCC= Modified Collaborative Coefficient; DC= Degree of Collaboration

Table 6 indicates the author's collaboration coefficient analysis of Bangladesh. The total output of 27 records was published during 2011-2020. In the case of a single-author publication, it was found one record during our study period. The papers were contributed by multi-authors with 27 records; followed by more than five authors and three authors with i.e.7, two and four, five authors with 4. The average number of CC is 0.487, MCC is 0.608 and DC is 0.075. The highest CC of 0.79 is found in 2020, and the lowest is 0.00 in 2011, 2012, and 2015. The highest MCC is 1.58 in 2020 and the lowest of 0.00 in 2011, 2012, 2013, and 2015.

Collaboration Coefficient analysis of Sri Lanka

Table 7: Collaboration Co-efficient analysis of Sri Lanka.

Authorship Pattern									
Years	1	2	3	4	5	>5	CC	MCC	DC
2011	0	0	0	0	0	0	0.00	0.00	0.00
2012	0	0	0	0	0	0	0.00	0.00	0.00
2013	0	0	0	0	0	0	0.00	0.00	0.00
2014	0	0	0	0	0	0	0.00	0.00	0.00
2015	0	0	0	0	0	0	0.00	0.00	0.00
2016	0	0	0	0	0	1	0.83	0.00	1.00
2017	0	0	0	0	1	0	0.80	0.00	1.00
2018	0	0	0	0	0	0	0.00	0.00	0.00
2019	0	0	0	0	0	1	0.83	0.00	1.00
2020	0	0	0	0	0	0	0.00	0.00	0.00
Total	0	0	0	0	1	2	2.47	0.00	3.00

CC= Collaboration Co-efficient; MCC= Modified Collaborative Coefficient; DC= Degree of Collaboration

Table 7 explains the collaboration coefficient analysis of Sri Lanka. The total output of 03 records has been published during the study period. The single author, two authors and four authors have not contributed during the study. The multi-authored publication has the highest record with 03; followed by more than five authored with 02, five authors with 01, four authors, three author authors, two authors, and single authors with zero publications. The average number of CC is 0.247, MCC is 0.00 and DC is 0.30. The highest CC of 0.83 is observed in 2016, 2019 and the lowest is 0.00 in 2011, 2012, 2013, 2014, 2015 and 2018, 2020. The highest MCC is 0.00 in all years and the lowest of 0.00 in all years. The highest DC of 1.00 is found in 2016, 2017, and 2019.

Collaboration Coefficient analysis of Nepal

Table 8: Collaboration Co-efficient analysis of Nepal.

Years	Authorship Pattern						CC	MCC	DC
	1	2	3	4	5	>5			
2011	0	0	0	0	0	0	0.00	0.00	0.00
2012	0	0	0	0	0	0	0.00	0.00	0.00
2013	0	0	1	0	0	0	0.00	0.00	1.00
2014	0	0	0	0	0	0	0.00	0.00	0.00
2015	0	0	0	0	1	0	0.80	0.00	1.00
2016	1	0	0	0	0	0	0.00	0.00	0.00
2017	0	0	0	0	0	0	0.00	0.00	0.00
2018	0	0	0	0	0	0	0.00	0.00	0.00
2019	0	0	0	0	0	0	0.00	0.00	0.00
2020	0	0	0	0	0	0	0.00	0.00	0.00
Total	1	0	1	0	1	0	0.80	0.00	2.00

CC= Collaboration Co-efficient; MCC= Modified Collaborative Coefficient; DC= Degree of Collaboration

Table 8 shows the collaboration coefficient analysis of Nepal. The total output recorded by Nepal is 03. Two authors, four authors, more than five authors have no publications. The multi-authors published the highest number of papers with 02; followed by single authors with 01, three and five authors with 01 publications. The average number of CC is 0.80, MCC is 0.00 and DC is 0.2. The highest CC of 0.80 is observed in 2015 and the lowest is 0.00 in 2011, 2012, 2014, 2016, 2017, 2018, 2019 and 2020. The highest MCC is zero in all years and the lowest of 0.00 in all years. The highest DC of 1.00 is found in 2013, 2015.

Activity Index (AI)

Activity Index (AI) characterizes the relative research efforts of a country in a given subject. In the present study, to show the performance of the SAARC Countries the Activity Index has been calculated for different years. Activity Index was first suggested by Frame and used among others by (Schubert & Braun, 1986)^[17], (De Solla Price, 1981)^[18], (Karki & Garg, 1997)^[19]. It is defined as:

$$A = \left[\frac{\text{Given field's share of the countries publications}}{\text{Given field's share of the world publications}} \right] \times 100$$

The technique used for calculating AI has been described below for research productivity by different countries in different blocks.

$$AI = \left[\frac{[N_{ij} / N_{io}]}{[N_{oj} / N_{oo}]} \right] \times 100$$

Where

N_{ij} = Number of publications in theme i and block A

N_{io} = Number of publications in theme i for all blocks

N_{oj} = Number of publications in all fields block A

N_{oo} = Number of publications for all fields and all blocks

AI = 100 indicates that the country's research work in the given field is corresponds Precisely to the world's average

AI > 100 reflects higher activity than the world's average, and

AI < 100 indicates lower than average effort dedicated to the field under study.

Activity Index of five SAARC Countries

Table 9: Activity Index of five SAARC Countries.

Year	World output	India	A I	Pakistan	A I	Bangladesh	A I	Sri Lanka	A I	Nepal	A I	Total SAARC
2011	323	14	35.32	3	108.47	0	0	0	0	0	0	17
2012	353	21	48.47	2	66.17	0	0	0	0	0	0	23
2013	337	24	58.03	2	69.31	1	42.36	0	0	1	2.42	28
2014	379	31	66.65	2	61.63	3	112.99	0	0	0	0.00	36
2015	334	28	68.31	2	69.93	0	0.00	0	0	1	2.44	31
2016	389	54	113.11	2	60.05	4	146.78	1	2.09	1	2.09	62
2017	390	55	114.91	1	29.95	4	146.40	1	2.09	0	0.00	61
2018	406	71	142.49	6	172.59	3	105.47	0	0.00	0	0.00	80
2019	473	98	168.82	6	148.15	10	301.78	1	1.72	0	0.00	115
2020	470	77	133.49	7	173.94	2	60.74	0	0.00	0	0.00	86
Total	3854	473	949.58	33	960.18	27	916.51	3	5.91	3	6.95	539

AI -Activity Index

Table 9 shows the Activity Index of SAARC Countries in heart attack research output. The world heart attack research output shows an increasing pattern from 2011-2020. India has recorded an overall activity index of 949.58. India's highest Activity Index came in 2019 (168.82) and the lowest found in 2011 (35.32). Pakistan has recorded 960.18 overall activities in the present study. Pakistan's highest Activity Index came in 2020 (173.94) and the lowest was in 2017 (29.95). Bangladesh has recorded 916.51 overall activities. The highest percentage of activity index by Bangladesh recorded in the year 2019 (301.78) and the lowest activity output in 2011, 2012, 2015 (0). The overall activity index of Sri Lanka is 5.91. Nepal has recorded 6.95 overall activities during the study period.

Findings and Conclusion

- The findings from the study revealed that out of 3854 publications in heart attack, 539 research output was published by 5 SAARC Countries. Among the SAARC, India is the highest contributor with 473 (87.76%) publications of which publications were published in the form of Article i.e. 2454 (63.67%), with citations with 33414(64.16%), citation per papers with 13.62 and h-index with 76.
- The authorship pattern on heart attack research of five SAARC Countries under shows that most of the papers were published by the collaboration of single authors i.e. 676, while the least number of papers was published by a ten author with 80 records. Collaboration Coefficient among five SAARC countries shows that India has the highest publication records with a total of 476 publications, out of which 539 publications were contributed by multi- authors. The average CC and MCC are the same as 0.618, 0.680 and DC is 0.40.
- The author's collaboration of Pakistan also shows that most of the publications are multi-authored i.e. of 33 records. The average number of CC is 0.786, MCC is 1.246 and DC is 1.00. The author's collaboration coefficient of Bangladesh shows the total output of 27 records from 2011-2020. Most of the papers (27) were Multi-authored with an average number of CC is 0.487, MCC is 0.608 and DC is 0.30.
- Sri Lanka too exhibited the same results with most of the publication by multi-authored collaboration with 03 records. The average number of CC is 0.247, MCC is 0.00 and DC is 0.30. Nepal also had most of its contributions to multi-authored collaboration with 03 records. The average number of CC is 0.800, MCC is 0.00 and DC is 0.20.

- Activity Index of five SAARC Countries in heart attack research output during shows that for India has recorded an overall activity index of 949.58. India's highest Activity Index came in 2019 (168.82) and the lowest found in 2011 (35.32). Pakistan has recorded 960.18 overall activities in the present study. Pakistan's highest Activity Index came in 2020 (173.94) and the lowest was in 2017 (29.95). Bangladesh has recorded 916.51 overall activities. The highest percentage of activity index by Bangladesh recorded in the year 2019 (301.78) and the lowest activity output in 2011, 2012, 2015 (0). The overall activity index of Sri Lanka is 5.91. Nepal has recorded 6.95 overall activities during the study period.

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