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Scientometric Analysis and Visualization of Astrovirus based on R-packages

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Abstract:

We examined scientific production of the astroviruses study community done the past two decades in the worldwide. Scientometric methods, particularly the literature development models, Document types, Most Global Cited Documents, Most Frequent Words, Authors collaboration, Author Impact (h-index, g-index, m-index), Most Local Cited Authors, Relevant Countries by Corresponding Author, Most Cited Countries, Most Relevant Affiliations are identified. The results of this study confess that the scientific literature on astroviruses in worldwide had grown-up exponentially with an annual growth rate of about 8.86% during the above declared period. Journal of medical virology were the most productive journals contributing 71 articles of the total publications. Infection children, diarrhea, gastroenteritis, identification, astrovirus, rotavirus. The USA produced maximum number (222) of articles as it has highest frequency (0.20%), single country publication (165), multiple country publications (57) and ratio of multiple country publication (026%) ranked first. 24 number of papers published from single-authored documents and 4570 number of papers published from multi-authored documents. Kramer A has got the highest citation (994 and Total Citation per Year: 66.27%), average citations per documents 26.17 percentage and average citations per year per documents 2.64 of during period.

Keywords: Astroviruses; Diarrhea; Classic human astrovirus; Novel Astroviruses; Scientometric; Biblioshiny

Introduction:

Human astrovirus (HAstV) was first depict edin1975 Appleton, H. (1975). From that point forward, astrovirus contaminations are a very much perceived reason for gastroenteritis worldwide and influence fundamentally little youngsters under two years. They are answerable for up to 10%of non-bacterial gastroenteritis A. Bosch, R.M. Pinto, S. Guix, (2014) ; J.E. Herrmann etal, (1991) and comprise the third most normal viral specialist of intense loose bowels after rotavirus and norovirus S.Shastri, etal, (1998). This lethal sickness is portrayed by hyperuricemia, with rate statement on the instinctive surfaces, joint container, cartila go articular is, kidney tubules, ureter, and other interstitial tissues. It was affirmed that this gout episode in the goslings was brought about by a novel goose astrovirus (N-GoAst V) (Liu et al., 2018; Chen et al., 2020). In any case, gout may have other endogenous and exogenous causes, for example, long-term use of grain containing high protein; deficiency of VA or VD; or the abuse, excess, and poisonousness related with meds. Hence, it is hard to affirm the real etiologic of gout via examination. Also, the bleakness and mortality inferable from gout brought about by N-GoAstV were high and the illness showed fast movement. Hence, there was a quick requirement for an exact discovery technique. The hindrances of utilizing an immunological technique as an analytic tool for novel microbes incorporated a need to plan and screen for profoundly explicit antibodies in the serum. The essential techniques at present utilized for diagnosing N-GoAstV in clinical examples are regular opposite record polymerase chain response (RT-PCR) (Yang et al., 2018; Chen et al., 2020) and turn around record quantitative PCR (RT-q PCR) (Yuanet al., 2018; Yin et al., 2020).

Table 1. Main information about data in Astroviruses

Description	**Results**
Timespan	2000:2019
Sources (Journals, Books, etc)	279
Documents	1113
Average years from publication	8.86
Average citations per documents	26.17
Average citations per year per doc	2.64
References	16319

We found table 1 the results that main information of astrovirus details 26.17 % average citations per documents, overall references 16319 respectively, while journals, Books, etc. contributed 279 research, 1113 documents produced during the years, average years from publication of 8.86% in astrovirus . Very smallest Average citations per year per doc for 2.64% span of the time 2000-2019.

Table 2. Most relevant sources in Astroviruses

Sources	Number of papers
Journal of medical virology	71
Archives of virology	60
Journal of clinical microbiology	45
Journal of clinical virology	41
Journal of virology	41
Avian diseases	37
Journal of virological methods	35
Infection genetics and evolution	34
Avian pathology	33
Plos one	31
Pediatric infectious disease journal	22
Journal of general virology	21
Emerging infectious diseases	17
Epidemiology and infection	17
Veterinary microbiology	17
Poultry science	14
Virology journal	14
Applied and environmental microbiology	13
Memorias do institute oswaldo cruz	12
Journal of applied microbiology	11

The table 2 revealed that top 20 number of sources of astrovirus. From these, we had analysed that the highest articles released by Journal of Medical Virology (71), followed by Archives of virology(60), Journal of Clinical Microbiology(45), two number of sources revealed same number of articles such as Journal of Clinical Virology (41) and Journal

Virology (41), Avian Diseases (37), Journals of Virological Methods(35), Infection Genetics and Evolution (34), Avian Pathology(33), Plos One(31), Paediatric Infectious Disease Journal (22), Journal of General Virology(21), three number of sources revealed same number of articles such as Emerging Infectious Diseases(17), Epidemiology and Infection (17) and Veterinary Microbiology(17), followed by another two number of sources released same number of articles such as Poultry Science(14) and Virological Journal(14). Overall smallest articles had Applied and Environmental Microbiology (13), followed by Memorias Do Instituto Oswal Do Cruz (12) and Journal of applied Microbiology (11).

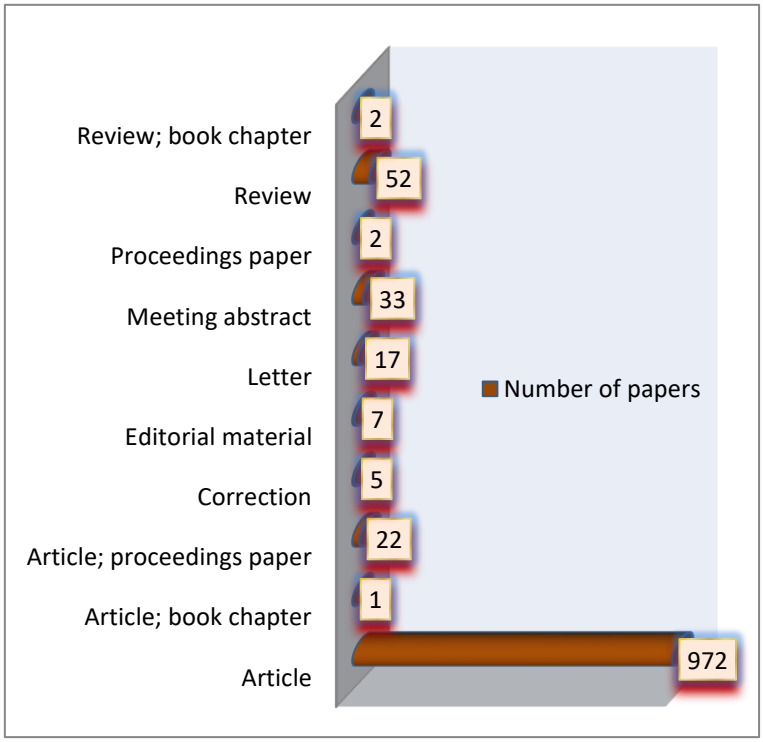

Figure 1. Document types in Astroviruses

The above fig.1 contained different types of document for astrovirus related articles published in the web of knowledge index core database. It showed that highest number of documents have delivered by articles (972 number of papers), followed by Review (52 number of papers), Meeting abstract (33 number of papers), Article; proceedings paper (22 number of papers), Letter (17 number of papers), Editorial material (7 number of papers) and Correction (5 number of papers). Proceedings paper (2 number of papers) and Review; book chapter (2) had same of documents. But very smallest of documents have delivered by Article; book chapter (1 number of paper).

The table 3 have two types of contents i.e Documents and Authors contents about astrovirus. The Document contents have 1830 Number of Keywords plus (ID) and 1360 Number of Author's Keywords (DE). Author's contents have 4594 Number of Authors, Number of Author Appearances, 24 number of papers published from single-authored documents and 4570 number of papers published from multi-authored documents.

Table 3. Document contents in Astroviruses

DOCUMENT CONTENTS	Number of papers
Keywords Plus (ID)	1830
Author's Keywords (DE)	1360
AUTHORS	
Authors	4594
Author Appearances	7477
Authors of single-authored documents	24
Authors of multi-authored documents	4570

The table 4 showed that Astrovirus, most Global Cited Documents provided various types of papers. The highest position had taken by Kramer A, 2006, BMC Infectious Diseases (Total Citations: 994 & TC per Year: 66.27%), followed by Platts-Mills JA, 2015, The Lancet Global Health (Total Citations: 331 & TC per Year: 55.17%). The following two papers have obtained same total citations and different TC in year (i.e) Phan TG, 2011, PLOS Pathogens (Total Citations: 232 & TC per Year: 23.20%) as compared to Finkbeiner SR, 2008, PLOS Pathogens (Total Citations: 232 & TC per Year: 17.85%). The next position obtained the paper of Svraka S, 2007, Journal of Clinical Microbiology had observed by citations (Total Citations: 223 & TC per Year: 15.93%) followed by Wilhelmi I, 2003, Clinical Microbiology and Infection (Total Citations: 211 & TC per Year: 11.72%), Arthur JL, 2009, PLOS Pathogens (Total Citations: 206 & TC per Year: 17.17%). LE Guyader F, 2000, applied and Environmental had obtained high level of total citations and very low level of TC per Year (Total Citations: 197 & TC per Year: 9.38%). Then, Paper of Yan HN, 2003, The Journal of Virological Methods had observed by citations (Total Citations: 186 & TC per Year: 10.33%). Followed by following two papers (i.e) LE Guyader FS, 2008 Journal of Clinical Microbiology (Total Citations: 182 & TC per Year: 14.00%) and DE Benedictis P, 2011, Infection, Genetics and Evolution (Total Citations: 177 & TC per Year: 17.70%)had

observed slowly decreased total citation and little increased TC per year. The next position occupied by the paper of Carter MJ, 2005, Journal of Applied Microbiology (Total Citations: 173 & TC per Year: 10.81%) followed by Quan PL, 2010, Emerging Infectious Diseases (Total Citations: 171 & TC per Year: 15.55%), two papers have obtained same total citations and different TC in year (i.e) Buss SN, 2015, Journal of Clinical Microbiology (Total Citations: 169 & TC per Year: 28.17%) and Pusch D, 2005, Archives of Virology (Total Citations: 169 & TC per Year: 10.56%). The paper of OH DY, 2003, Journal of Medical Virology had observed by citations ((Total Citations: 168 & TC per Year: 9.33%) followed by Clark B, 2004, Current Opinion in Infectious Diseases (Total Citations: 167 & TC per Year: 9.82%), Liu j, 2013, Journal of Clinical Microbiology (Total Citations: (Total Citations: 160 & TC per Year: 20.00%) and Terry FFN, 2012, Journal of Virology (Total Citations: 152 & TC per Year: 16.89%). The overall from the table 4, most global cited documents had observed by Svenungsson B, 2000, Clinical infectious diseases (Total Citations: 151 & TC per Year: 7.19%).

Table 4. Most Global Cited Documents in Astroviruses

Paper	Total	TC per Year
Kramer A, 2006, BMC Infectious Diseases	994	66.27
Platts-Mills JA, 2015, The Lancet Global Health	331	55.17
Phan TG, 2011, PLOS Pathogens	232	23.20
Finkbeiner SR, 2008, PLOS Pathogens	232	17.85
Svraka S, 2007, Journal of Clinical Microbiology	223	15.93
Wilhelmi I, 2003, Clinical Microbiology and Infection	211	11.72
Arthur JL, 2009, PLOS Pathogens	206	17.17
LE Guyader F, 2000, Applied and Environmental Microbiology	197	9.38
Yan HN, 2003, The Journal of Virological Methods	186	10.33
LE Guyader FS, 2008 Journal of Clinical Microbiology	182	14.00
DE Benedictis P, 2011, Infection, Genetics and Evolution	177	17.70
Carter MJ, 2005, Journal of Applied Microbiology	173	10.81
Quan PL, 2010, Emerging Infectious Diseases	171	15.55
Buss SN, 2015, Journal of Clinical Microbiology	169	28.17
Pusch D, 2005, Archives of Virology	169	10.56
OH DY, 2003, Journal of Medical Virology	168	9.33
Clark B, 2004, Current Opinion in Infectious Diseases	167	9.82
Liu j, 2013, Journal of Clinical Microbiology	160	20.00
Terry FFN, 2012, Journal of Virology	152	16.89
Svenungsson B, 2000, Clinical infectious diseases	151	7.19

TC- Total Citations

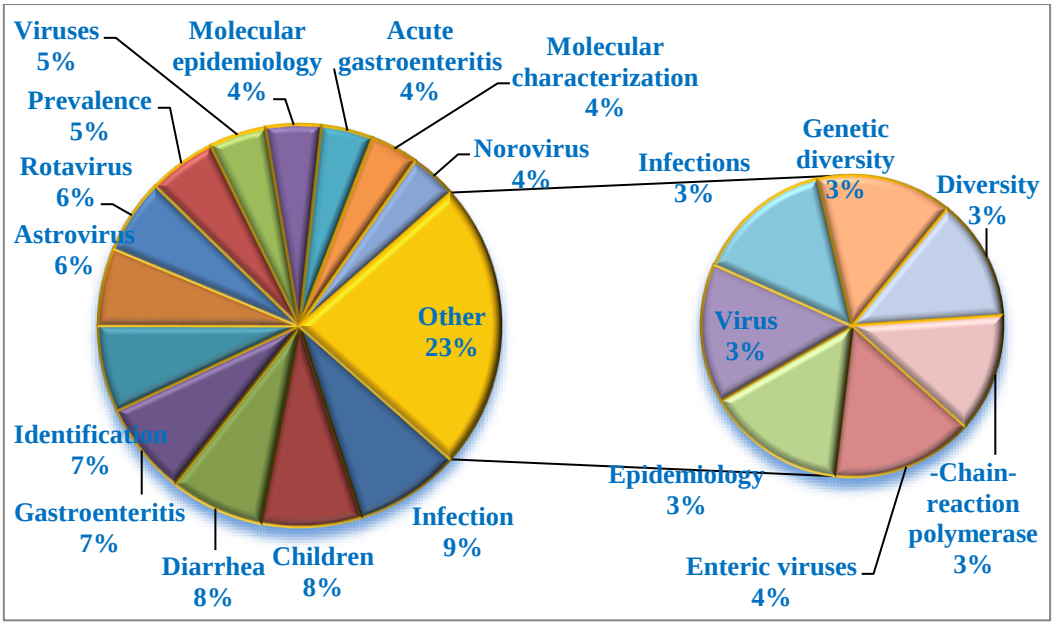

Figure 2. Most Frequent Words in Astroviruses

The above fig. 2 presented the words occurrences analysis that is based on the separate counting of words in the article of astrovirus. The highest most frequent words were occurrence by words of infection (228), followed by children (216), diarrhea (203), gastroenteritis(199), identification (186), astrovirus (168), rotavirus (161), prevalence(145), viruses (124), molecular epidemiology(119), acute gastroenteritis (111), molecular characterization(103), norovirus (100) and enteric viruses(95). Two number of papers words (i.e.) epidemiology (92) and virus (92) were occurrence equally. Furthermore, words of infections (91), genetic diversity (90), diversity (81) and chain-reaction polymerase (78) were occurrence in the above figure. For discrimination of the article parts, the already existing, implicit tagging must be minimally assisted by the user.

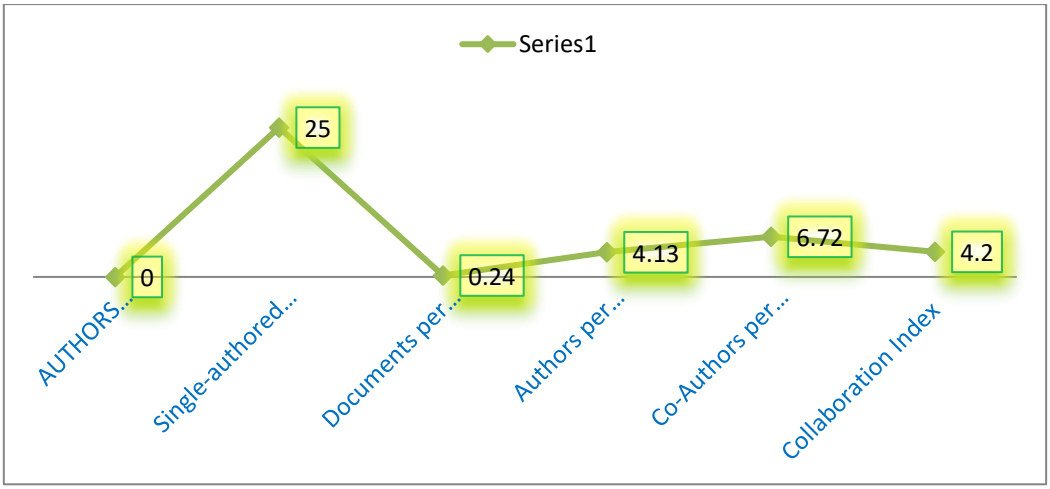

Figure 3. Authorship collaboration in Astroviruses

Collaborative author networks within the article of astrovirus were determined using published documents. From the above fig.3 found that 25 numbers of papers Single-authored documents, 0.24% of documents per Author, 4.13% of Authors per Document, 6.72% of Co-Authors per documents and 4.2% of Collaboration Index were available of author's collaboration details. This will help researchers focus their studies on key issues, and allow each other to offer reasonable suggestions.

Table 5. Author Impact in Astroviruses

Author	h-index	g-index	m-index	TC	NP	PY start
Ushijima H	23	37	1.10	1495	46	2000
Okitsu S	20	34	1.11	1196	37	2003
Leite Jpg	14	24	0.70	621	28	2001
Schultz-cherry S	19	28	0.91	964	28	2000
Khamrin P	14	23	0.82	568	25	2004
Maneekarn N	14	23	0.82	548	24	2004
Bosch A	17	23	0.85	887	23	2001
Guix S	16	23	0.8	843	23	2001
Pinto Rm	17	23	0.85	887	23	2001
Phan Tg	18	20	1.06	1090	20	2004
Banyai K	11	18	0.65	328	19	2004
Miagostovich Mp	11	18	0.79	491	18	2007
Arias Cf	13	17	0.62	481	17	2000
Martella V	11	15	1.00	255	17	2010
Delwart E	15	16	1.25	955	16	2009
Koci Md	11	15	0.52	450	15	2000
Mitchell Dk	10	15	0.48	356	15	2000
Thongprachum A	10	15	0.91	280	15	2010
Wang D	12	15	0.92	878	15	2008
Goyal Sm	9	14	0.75	226	14	2009

TC- Total Citation, NP – Number of Papers, PY –Published Year

This table 5 of author impact of astrovirus presents the value of the author's h-index, g-index, m-index, and TC, NP and PY start of the articles of astrovirus. The top position of author Ushijima H was greatest values of h-index (23) than followed by authors (19) in mentioned in the table. It should be noted that there are five authors got same value of g-index (23) and g-index (15) respectively. Two authors got same value of m-index (0.82) & (0.85). The highest TC has three authors (1495, 1196 & 1090) than followed by 17 authors in the table. It should be also noted that there are four authors had same number of articles published (15) but two same publication started year 2000 and another one was 2010, 2008.Three authors published same numbers of articles (23) and same publication started year 2001.

Table 6. Most Local Cited Authors in Astroviruses

Authors	Articles	Authors- Fractionalized	Articles Fractionalized
Ushijima H	46	Schultz-cherry S	7.47
Okitsu S	37	Ushijima H	6.33
Leite JPG	28	Okitsu S	4.93
Schultz-cherry S	28	Koci MD	4.51
Khamrin P	25	Bosch A	4.45
Maneekarn N	24	Pinto RM	4.45
Bosch A	23	Guix S	4.30
Guix S	23	Day JM	4.23
Pinto RM	23	Mitchell DK	3.70
Phan TG	20	Spackman E	3.67
Banyai K	19	Arias CF	3.62
Miagostovich MP	18	Leite JPG	3.48
Arias CF	17	Zsak L	3.42
Martella V	17	Khamrin P	3.34
Delwart E	16	Maneekarn N	3.33
Koci MD	15	Wang D	3.26
Mitchell DK	15	Marshall JA	3.23
Thongprachum A	15	Mendez E	3.01
Wang D	15	Krishna NK	2.98
Goyal SM	14	Sanchez-fauquier A	2.70

The twenty authors implicated in study of astrovirus are listed in the table 6 of most local cited authors. From these, we can study that top highest articles published by author of Ushijima H (46) have author- Fractionalized (Schultz-Cherry S) and have articles fractionalized (7.47%). Among all these authors, four authors have published articles (15), three authors (23), two authors (28 & 17) respectively. As per authors fractionalized lists in the above table, we found that only two authors have same value of Articles Fractionalized (4.45%). Furthermore, we have analysed from published articles and authors fractionalized, the overall performance of articles fractionalized of authors slowly decreased from top most to lowest authors in the field.

The contribution of relevant countries was estimated by 928 total number of articles published respectively the 20 countries and we have a ranked by articles wise, their frequency, number of single country publication, and number of multiple country publication and ratio of multiple country publication in data available in the above table 7. In this study of astrovirus, we found USA (222), China (120), Brazil (73) and Japan (72) as productive countries of articles. The USA produced maximum number (222) of articles as it has highest

frequency (0.20%), single country publication (165), multiple country publications (57) and ratio of multiple country publication (026%) ranked first in the table. China, Brazil and Japan ranked second, third and fourth respectively. Japan had multiple country publication and ratio of multiple country publication (MCP: 34 and MCP Ratio: 0.47%) than china(MCP:16 and MCP Ratio: 0.13%) and brazil(MCP:9 and MCP Ratio: 0.12%).The following 8 countries (Australia, Canada, Hungary, Netherlands, Mexico, Switzerland, India and Ireland) had same value of frequency (0.02%).Moreover, two countries (Mexico, Switzerland) had same value of articles (20), frequency (0.02%), SCP (17), MCP (3) and ratio of MCP (0.15%). Rest of the 7 countries (France, Italy, Spain, Korea, United Kingdom, Germany, and Sweden) were ranked as the productive countries of articles in the study of astrovirus, but IRAN was least production in the list because it had no value for MCP and ration of MCP.

Table 7. Relevant Countries by Corresponding Author in Astroviruses

Country	Articles	Frequency	SCP	MCP	MCP
USA	222	0.20	165	57	0.26
China	120	0.11	104	16	0.13
Brazil	73	0.07	64	9	0.12
Japan	72	0.07	38	34	0.47
France	49	0.05	36	13	0.27
Italy	48	0.04	31	17	0.35
Spain	44	0.04	37	7	0.16
Korea	36	0.03	35	1	0.03
United Kingdom	35	0.03	27	8	0.23
Germany	31	0.03	23	8	0.26
Australia	27	0.02	24	3	0.11
Canada	24	0.02	19	5	0.21
Hungary	22	0.02	11	11	0.50
Netherlands	21	0.02	17	4	0.19
Mexico	20	0.02	17	3	0.15
Switzerland	20	0.02	17	3	0.15
India	19	0.02	14	5	0.26
Ireland	17	0.02	15	2	0.12
Sweden	15	0.01	8	7	0.47
Iran	13	0.01	13	0	0.00

SCP – Single Country Publication; MCP- Multi Country Publication

Table 8. Most Cited Countries in Astroviruses

Country	Total Citations	Average Article Citations
USA	8414	37.90
Japan	2231	30.99
Germany	1934	62.39
China	1658	13.82
France	1627	33.20
United Kingdom	1404	40.11
Spain	1379	31.34
Brazil	1246	17.07
Italy	1179	24.56
Australia	791	29.30
Netherlands	736	35.05
Sweden	610	40.67
Mexico	503	25.15
Korea	502	13.94
Ireland	407	23.94
Hungary	404	18.36
Finland	394	39.40
Switzerland	386	19.30
Canada	385	16.04
India	273	14.37

Table 8 showed that Top twenty countries with the largest shares of articles about astrovirus indexed in various publications. Only countries with are listed, in decreasing order of the total citations of articles. As expected, the USA (Total citations: 8414) is at the top of the list of countries, followed by Japan, Germany, China and France as the countries contributing the largest numbers of articles, but highest 62.39% were Average Article Citations from the Germany. USA appears first in the total numbers of citations. However, it did not get first position in Average Article Citations (37.90%). Sweden had got lowest total citations (610) which got second highest average article citations (40.67%). Over all analysis

in the above table shows that India had lowest total citations (273) and average article citations (14.37%).

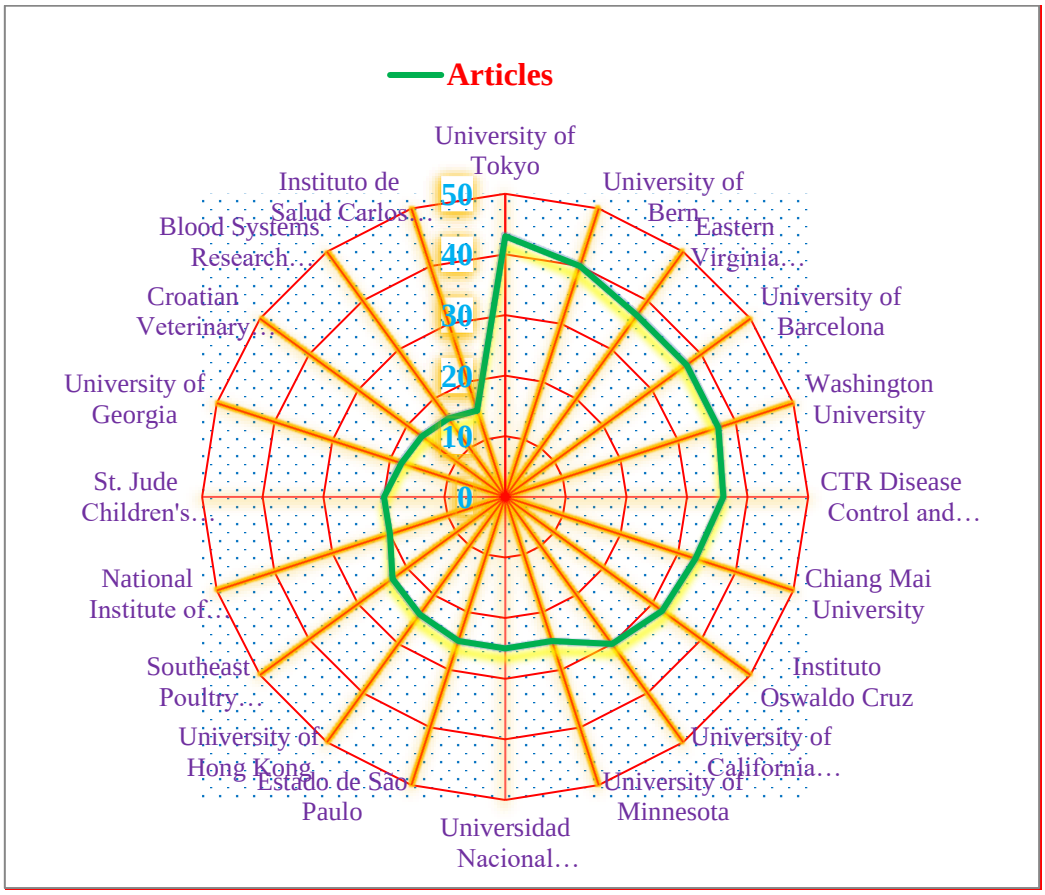

Figure 4. Most Relevant Affiliations in Astroviruses

The data presented in most relevant affiliations fig. 4 show that affiliations of University Tokyo had published highest number of articles (43), followed by University Bern (40). Three affiliations publishing of same number of articles (37) by Eastern Virginia Medical School, University Barcelona and Washington University as well as three affiliations publishing of same number of articles (25) by University of Minnesota, Universidad Nacional Autónoma de Mexico and Southeast Poultry Research Laboratory. In addition, two affiliations (National Institute of Allergy and Infectious Diseases and St. Jude Children's Research Hospital) are publishing same numbers of articles (20). Most of the institutions will concentrate the additionally publishing of articles about astroviruses in the future.

CONCLUSION

In this investigation the creators have examined the creation and effect of astroviruses related exploration distributed somewhere in the range of 2000 and 2019, as listed by

Clarivate Analytics' Web of Science core collections. Albeit the authors has developed consistently, with commitments by specialists from around the world, relative development has been a lot higher by scientists with affiliations of University Tokyo. Generally speaking Total Citation and Number of Papers, there keeps on being solid h-index and g- index by Ushijima H beginning from 2000, simultaneously Global Cited Documents most noteworthy position had taken by Kramer A, 2006, BMC Infectious Diseases (Total Citations: 994 and TC each Year: 66.27%). The developments in research literature and in the vocabulary utilized show progressing revenue and examination in more up to date areas, Africa based countries didn't aware and involve of this virus related research. Future examination may wish to investigate the impact of funding availability in various territories of the world as a potential influencing factor in the creation of Astroviruses-related literature.

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