Mapping of Autism Spectrum Disorders Research: A Bibliometric Analysis of Highly Cited Research Output

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The main purpose of the study was to the mapping of Autism Spectrum Disorders (ASD) research a bibliometric analysis of highly cited research output from 2009–2019. ASDs are common lifelong neurodevelopment conditions characterized by qualitative impairments in social communication and interaction, involvement in rituals and routines, and hypo-sensory or hyper-sensory sensitivities. In the present study, we attempt to analyze 707 articles on ASD, indexed in the Web of Science database during 2009-2019. The study finds out that while the USA takes top position with its contribution to ASD. The King's College London, the publication number of which is 62, ranked first. Geschwind DH was the most productive author, with h_index 27, g_index 30, m-index 2.25 of total publications published in 2009. The highest impact factor journal was Nature, that is, IF43.070. The most popular (since 2013) paper was published by Hsiao EY in the field of microbiota regulation of behaviour and physiological disturbances linked to neurodevelopmental disorders. The analysis was carried out a total of 707 articles related to ASDs were written by 8864 authors. Article (441) was the most frequent form of publication. The most frequent documents, such as Article, the web of Science Core Collection of the total citation were 108541. The study found that while the United States took the top position with its contribution.

Keywords: Autism Spectrum Disorders; ASD; Bibliometric; Research output; Citation Analysis

Introduction

Autism Spectrum Disorders (ASDs) is a developmental disorder that influences communication and behaviour. ASD describes a category of early-stage neurodevelopmental disorders that affect the social interaction and communication skills of the people affected (Sweileh et al., 2016). Individuals with ASDs Demonstrate a range of communication difficulties, including limited understanding and use of language and non-verbal aspects of interactions (Duncan & Holverstott, 2007). The autism assessment evaluation plan is structured to assess relative to the triad characteristics of autism the expression of emotional responses and communication attempts. It has four modules that are (a) pre-verbal/single words; (b) speech; (c) fluent voice child; and (d) fluent adolescent/adult speech, which are determined by the degree of communication among children. This helps the observer or clinician to monitor the range of manifestations of the central triadic symptoms of ASDs, including worsening social interaction, cognitive difficulties and repetitive and stereotypical activities coupled with impaired imagination or symbolic play skills(Gotham et al., 2007).

Hence, modern autism specialists articulate several autism variants. The spectrum of autism varies from highly articulate, fully functioning, high intellectual people to nonverbal persons with low IQ. Based on your place in the autism spectrum and environmental obstacles, these defects cannot be disabling. Around 10% of people with autism have other talents special specific qualities such as memorizing lists, calendar dates, drawing talents, or musical abilities. Many individuals have impaired sensory experiences of autism(Albrecht et al., 2006).

The goal of this paper is to analyze the overall image of published literature in the field by drawing up a bibliometric study, defining key themes and analyzing their effects. The patterns and paths of study that often suggests scientific accomplishment, are seen in bibliometric studies(Jabali, Karim A; Ashiqu, M.; Ahmad, S.; Rahman, 2020). Further, the bibliometric study analyzes research patterns. The bibliometric has been described by Sengupta employing mathematical and statistical calculations

As organizing, classifying, and quantitating publications of the macro communication pattern alongside their writers (Sengupta, 1974). It is a cross-disciplinary science of quantitative analysis of all information carriers by mathematical or statistical methods and is used as statistics to analyze books, papers, and others publication(Merigó et al., 2016). It is a common tool used to define a particular area's growth. Throughout the early 20th century, the first bibliometrics started(Merigó et al., 2015; Valenzuela et al., 2017).

Cole and Eales researched the growth of literature by means of bibliographical references in comparative anatomy in 1917 respectively(Osareh, 1996).1969, in place of the statistical bibliography the renowned British scientist Allen Richard first suggested the term Bibliometrics. This term is used to mark the official birth of bibliometrics(Pritchard, 1969). Though, this work has gained more and more coverage. The bibliometrics most obvious benefit is, by studying co-citations, regional distribution and word frequency, enabling scholars to examine particular research fields and draw very useful conclusions. The bibliometrics was previously commonly used in hotspots(Yeung et al., 2017).in co-authorship(Sweileh et al., 2016).in co-citations and in the growth of the fields as a whole. The purpose of this study mapping of research output on ASD a bibliometric analysis of during the period 2009–2019.

Background

In recent years, many researchers have performed the bibliometric analysis in different subject fields. The following studies related to the objectives of this study have been reviewed.This article reviews a few studies conducted on a global level. 'Autism' or 'autism spectrum disorder': this is a common form of autism developmental disorder diagnosis. However, it remains the case that in many cases it is very difficult to distinguish the predictive validity of the diagnosis of ASD from that of intellectual disability(Hassall, 2016). The early detection, diagnosis, and treatment of autism spectrum disorder are affected by socio-cultural influences. The early detection and intervention of ASD symptom, it is to increase understanding of ASD and its effect on families. Strong policies

Efforts can help people with ASD reach their full capacity and dignity(Monica Juneja Smitha Sairam, 2018; Tyagi et al., 2019). The main objective of the study was too restricted and repetitive behaviours (RRBs) form a central feature of autism disorders. They are a major obstacle to learning and social adaptation, new measuring methods have been developed over the last decade to improve the explanation of RRBs. The study suggests that RRBs can naturally decrease over time, which is improved for the aged with greater cognitive capacity and linguistic skill(Leekam & Prior, 2011). Such results support the continued use of the sub-categories of limited, repetitive behaviours, especially IS behaviours, to establish more consistent sub-groups of childhoods with ASD(Bishop et al., 2013).

The study of Mackintosh et al., (2005) focuses that the parents of children with ASD were the most common source of both information and support. Lower-income parents used fewer sources of knowledge than medium or high-income parents and received less assistance. Lower-income parents, in particular, are less likely to attend community sessions on autism(Mackintosh et al., 2005). Jeyshankar and Vellaichamy (2016) examined the 13079 world autism literature indexed to the Scopus database in 2007-11. The study also examined the fact, that together Indian scientists have published 134 articles on autism research. India ranks 17th in Autism studies, with a worldwide share of publications of 1,01% (Jeyshankar & Vellaichamy, 2016). Fernández-Herrero et al., (2018) study was aimed at Using the ISI web of knowledge (WoK) as the reference database for carried out a bibliometric analysis into the use of VR as an educational tool for ASD children. The study demonstrated the significance of the disparity between the two dimensions of the test and VR educational tool used for children who are participating in ASD(Fernández-Herrero, J.; Lorenzo-Lledó & A., 2018). The purpose of the study conducted by Dai et al. (2019) was to elucidate the incidence of Autism disorder and risk factors for children aged 18-40 months in Hubei Province, China, suggesting that control of perinatal adverse events may prevent ASD. ASD may be prevented in children aged 18-36 months (Dai et al., 2019). The goal was to determine if prenatal valproate use was associated with

An increased risk of autism in infants. Maternal use of valproate in pregnancy was associated, even after modification of maternal epilepsy, with a substantially increased risk of autism spectrum and developmental autism in young children(Christensen, J., Grønborg, T. K., Sørensen, M. J., Schendel, D., Parner, E. T., Pedersen, L. H., & Vestergaard, 2013). Similarly, it was noted from the related analysis that the year 2006 showed the highest number of contributions to the IFLA Journal (Hussain, A & Fatima, 2011). Likewise, in 2007 the maximum number of contributions to CLIEJ is exhibited. Most of the publications were by single authors. The most proliferated authors have been Gang Wan, Jian Anna Xiong and Zhixian Yi. In addition to some other countries including India, Nigeria, China and Pakistan, the United States has contributed on top(Akhtar Hussain & Fatima, 2011). The most proliferating authors have been Gang Wan, Jian Anna Xiong and Zhixian Yi. More papers were published by the United States.In this study, the metadata of the literature obtained by using three keywords of search, that is, visual search, eye movement, and eye-tracking was used as content and network analysis. This research identified the patterns for 100 of the most widely cited studies of neuro-imaging of primary psychiatric disorders(Gong et al., 2019). The findings have shown a continuous increase in the total number of publications and collaborative works (particularly since 1999), as well as correlation in the general context of the papers with autism recommendations published for the same period in the Anglo-Saxon arena(Carmona et al., 2010).

Bibliometric results indicate that graphene in nanotechnology is growing steadily in the field of scientific research. Graphene can also be used in medical technology as well as electronics (Derviş, 2019).The purpose of the study was to illustrate the scientometric analysis of data mining literature the major findings of the study were between 144 and 823 citations for the top 51 of the cited papers. Between 2002 and 2011, the 51 most popular papers were published with a majority of the 11 (21.67%) published in 2003, while nine (17.65%) published in 2002. Impact factors ranged from 29. 65 to 0.62 for newspapers with the top 51, while the impact factor for journals ranged from 34.52 to 0.65 for 5 years(Nisha et al., 2015). Submit

Valuable information on a research article by authors, title and abstract. A latent technique for the latent Dirichlet allocation of themes and keywords from articles is performed in this study: five keyword popularity (KP) functions have been identified as indicators of emerging patterns in articles(Blei et al., 2003; Hu et al., 2020). The study examines the leading and reliable metrics of journal work quality recognized for the assessment and judgment of scientific journals in environment engineering by professional and academic communities. The prime quality criteria of each journal examined are set in distinct and valued databases such as Web of Science and Scopus(Ahmad et al., 2017; Tiemo et al., 2011). There are 66 major immunology journals, covering the fields of medical science, immunology, basic biology, and primarily biochemistry. In the world, the United States takes top ranking with 65.15 per cent inputs (43 newspapers). The results of this analysis suggest that 61 of 66 (92.42%) of the main Immunology journals are published in the English language(Arora, J & Kaur, 1994). This article analyzes the consistency indexes in the Journal's Impact Factor sports science. There have been efforts to link quality indices of JIF, SJR, ES, and H5 for the ranking and quality rating for sports journals. In the same way, SPSS Pearson's and Spearman's statistical correlations were represented as correlations between indicators (Waris et al., 2017). The findings indicate that many interdisciplinary journals are more successful than the core journals, although those journals are also well placed on the field (Zurita et al., 2016). In Scopus database, there have been 13455 papers on dyslexia published in nine forms of text and 28 languages. The literature was produced annually at 6 per cent. The USA made the largest contribution of 98 nations. In terms of total reporting, India ranked 20th (Ram, 2018). A study by Ahmad, et al (2017) found that leading and reputable quality metrics for journal research recognized as evaluations and assessment in environmental engineering by science and academic communities (Ahmad et al., 2017). While two authored contributions have been found to be the largest number of publications. It is noticed that the Tropical Agriculture Journal leads the table with a record of 17 citations (Hussain,A.; Fatima, N. Mohd, 2011).

This paper analyzes India's 1990-2009 growth trends for nanoscience and nanotechnology, and the contribution by India has increased significantly over the last 5 years. The United States, China, and Japan currently lead the field of Nanosciences and Nanotechnology (Karpagam et al., 2011). The majority of papers were published by single authors; only fifteen special issues were published by influential editors and guest editors of LIS professionals of 66 editions published during 2000-2010 (Hussain et al., 2011). The purpose of the study was to highlights a bibliometric overview of the literature covered by the PubMed research period from 1974 to 2013, in the field of teaching disabilities. The major findings of the study were to the U.S. contributed the greatest number of study documents records(Jeyanthi et al., 2015). Likewise, the purpose of this analysis was to compare the journal impact factor, SCimago journal range, the score and the h5-index of journals in environmental engineering (Ahmad et al., 2017). The primary goal of the study was scientific innovation research in a country context. The United States and the United Kingdom are the most productive per capita countries in the major countries in this region (Merigó et al., 2016). It is noticed that out of a total of 495 top papers, three authored articles are significantly ahead of two authored articles followed by four authored articles, while single-authored articles (59 articles) are in the background. It is obvious that Akyildiz, I. F (USA) is ranked first (Hussain & Swain, 2011). As a result, in the King Saud University-Computer Sciences Journal, the collaborative degree standard is 0.695 from2004 to 2014 and clearly indicates in his contributions the supremacy of multiple authorship over a single author. It was developed that the majority of King Saudi Arabia authors contributed to the article by JKSU-CIS, followed by the India authors at the National Institute of Computer Sciences (Hussain, 2017).

Methods

Bibliographical information was collected using the keyword Autism Spectrum Disorders in the article title, abstract, or keywords for the research on the Web of Science's core database. A total of 4,999 publications have been published during the period 2009–2019. All documents searched for TS = (Autism

OR Autism Spectrum Disorder). This study has refined by: ESI Top Papers: (Highly Cited in Field) AND [excluding] DOCUMENT TYPES: (DATA PAPER) during 2009-2019.

Indices such as Science Citation Index Expanded (SCI-EXPANDED), Social Science Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), Conference Proceedings Citation Index-Science (CPCI-S), Conference Proceedings Citation Index-Social Sciences & Humanities (CPCI-SSH), Emerging Sources Citation Index (ESCI), Current Chemical Reactions (CCR-Expanded) and Index Citation Index (CCR-Expanded) are selected. While we have downloaded 707 records, the number of files may change as more articles are published. All document types: articles, book chapter, proceeding papers, review and review book chapter.

In this study, first of all authors have installed the latest version 1.442 of RStudio on Windows 10. Second, authors have set up a bibliometrix package within the R environment to analyse and map bibliographic data if it has not yet been installed. The authors then used the bibliometrix functions to create a descriptive and co-citation network, respectively.The readfile and convert2df functions embedded in biblimetrix are used. While the readfile function loads and converts text data to UTF-8 format, the convert2df function extracts and creates a data frame that corresponds to the analysis unit within the exported file from the Web of Science database. Eventually, the bibliometric analysis function generates descriptive data from bibliographic data. The results can be drawn from the generic function in R (White et al., 2009)in R. There are following research questions for the present study as:

01. What are publishing trend has been followed in the ASDs research from 2009-2019?

02. What are the most productive authors, Institutes, and countries in ASDs research?

03. What are the preferred journals of ASDs researchers?

04. What are authorship and collaborative patterns research in ASD?

05. What have frequently used Keywords patterns of ASD research?

Results

Bibliographical information was collected using the keyword Autism Spectrum Disorders in the article title, abstract, or keywords for the research on the Web of Science's core database. A total of 4,999 publications have been published during the period 2009–2019. Consequently, the time period of the study was since 2009-2019 was used.

Main Information about data

Table 1 shows that a total of 707 articles were written by 8864 authors. It's quite a large number of authors. Funding has motivated more scientists to participate in the publication of scientific articles (This is the assumption). Collaboration is the key among authors, of which 32 authors have published only. This table also discusses the average quotations of 236.3 for each document, followed by an author for each document (8.2). Subsequently, the co-authors of the documents are 12.5.

Table 1: Main Information about data

Description	Results
Articles	707
Sources (Journals, Books, etc.)	225
Keywords Plus (ID)	2839
Author's Keywords (DE)	1228
Period	2009 - 2019
Average citations per documents	236.3
Authors	5796
Author Appearances	8864
Authors of single-authored documents	32
Authors of multi-authored documents	5764
Single-authored documents	35
Documents per Author	0.122
Authors per Document	8.2
Co-Authors per Documents	12.5
Collaboration Index	8.58

Year-wise distributions

The year-wise distribution of articles was published in 2009-2019. Of the total 707 articles, the most number of articles (80) was published in 2016, it had accrued more than 10,277 citations, MeanTCperArt (128.46%), MeanTCperYear(32.12%) and CY (4) to the total quantity of articles, whereas total articles (78) were published in 2019, 1606 citations, MeanTCperArt (20.59%), MeanTCperYear (20.59%), and CY (1). Followed by

Using total articles publications (77), 24640 citations, MeanTCperArt(320.00%), MeanTCperYear(53.33%), and CY(6) in 2014. The minimum number of articles (42) was published, more than 19612 citations, MeanTCperArt (466.95%), MeanTCperYear (42.45%), and CY (11) in 2009(see Table 2).

Table 2: Year-Wise Distribution

Year	TP	TC	MeanTCperArt	MeanTCperYear	CY
2009	42	19612	466.95	42.45	11
2010	47	21513	457.72	45.77	10
2011	54	23059	427.02	47.45	9
2012	70	24864	355.20	44.40	8
2013	55	17372	315.85	45.12	7
2014	77	24640	320.00	53.33	6
2015	69	12824	185.86	37.17	5
2016	80	10277	128.46	32.12	4
2017	72	7651	106.26	35.42	3
2018	63	3622	57.49	28.75	2
2019	78	1606	20.59	20.59	1

Note: TP=Total Publications, TC=Total Citation, CY= Citation Year

Document types

In total,707 documents met the selection criteria. Five document types were found in these 707 publications, Article (441) was a most frequent form of publication, followed by Review (247), Review; Book Chapter (14), Article; Proceedings Paper (4), and Article; Book Chapter was contributing (1). The most frequent documents like Article, it was Web of Science Core Collection Times Cited Count (108541) with Usage Count (Last 180 Days)(2958), Usage Count (Since 2013) (33769) (Table 3).

Table 3: Document Types

DT	TP	TC	TCC	U1	U2
ARTICLE	441	108541	110947	2958	33769
REVIEW	247	54785	56136	2938	29665
REVIEW; BOOK CHAPTER	14	2637	2722	128	1266
ARTICLE; PROCEEDINGS PAPER	4	448	454	80	246
ARTICLE; BOOK CHAPTER	1	629	634	12	248

Note: TP=Total Publications, TC=Total Citation, TCC= Total Citation Count,

U1=Usage Count (Last 180 Days), U2=Usage Count (Since 2013)

Country-wise distribution

Authors' countries of affiliation are used to set up the origin of articles, and the contribution of the first author is standard as the foremost contribution to the work. A total of 707 articles from 59 nations were published.The study find out that whilst the USA takes top position with its contribution 482 (TC = 125751), UK 173(TC = 40395), Canada 88 (TC = 22200),Australia 61 (TC = 10164), Germany 60(TC = 13935), Netherland 54 (TC = 14064),Sweden 53 (TC = 11987),and Italy 44 (TC = 10108).The least number of Authors from France 37 (TC = 9576) and Denmark 34(7178) were contributed separately (See Table 4).

Table 4: Country-wise

Country	TP	TC
USA	482	125751
UK	173	40395
Canada	88	22200
Australia	61	10164
Germany	60	13935
Netherlands	54	14064
Sweden	53	11987
Italy	44	10108
France	37	9576
Denmark	34	7178

Note: TP=Total Publications, TC=Total Citation

Most Highly Cited Organizations

The contributions of the 15 most productive organizations are ranked in Table 5. The King's College London, the publication number of which is 62, ranked first, the most citations (12759), and the total citation ranked of 10. The University of California, Los Angeles was the ranked second most highly published organization (TP=60), and citation (18340), followed by the Harvard University (TP=57), citation (21110) and cited ranked of 2. In the terms of the most highly cited organizations, the University of Washington in the lead, that is, published articles (TC=50), citations (21540), and the total citation ranked of first. Further followed by Harvard University (TP=57), citation (21110) and cited ranked a second.The UCL has TP=39, published ranked seventh and most citations (7550) and citation ranked is fourteenth, whereas the University of California, San Francisco have TP=39, published ranked seventh and citations (13734) and citation ranked is eight. Moreover, Karolinska

Institutet-a medical university, Massachusetts General Hospital, Stanford University and University Pennsylvania have TP (37) and rank is eighth but highly citation ranked are fifteenth, eleventh, and fourth, similarly. The University of Pittsburgh and the Yale University have TP=34 and RTP=9 similarly but TC=15227, RTC=5 as well as TC=14393 and RTC=6. The Columbia University have TP=33, RTP=10, TC=10891 and RTC=12.

Table 5: Most Highly Cited Organizations

Organization	TP	R(TP)	TC	R(TC)
King's College London	62	1	12759	10
University of California, Los Angeles	60	2	18340	3
Harvard University	57	3	21110	2
University of Washington	50	4	21540	1
University of North Carolina	46	5	13298	9
University of California, Davis	42	6	10868	13
UCL(London's Global University)	39	7	7550	14
University of California, San Francisco	39	7	13734	8
Karolinska Institutet-a medical university	37	8	7021	15
Massachusetts General Hospital	37	8	12214	11
Stanford University	37	8	13968	7
University of Pennsylvania	37	8	15541	4
University of Pittsburgh	34	9	15227	5
Yale University	34	9	14393	6
Columbia University	33	10	10891	12

Note: TP=Total Publications, TC=Total Citation, R=Rank

Productive authors

Geschwind DH was the most productive author published (30 articles; 7771 citations) in 2009, followed by Lord C (19 articles; 7653 citations), and Sanders SJ (19 articles; 7653 citations) in 2011. For citation impact, Devlin B ranked first with 11300 citations, followed by Geschwind DH (9971 citations), and Cook EH (15 articles; 8735 citations).

On the author's quality parameters h_index, g_index, and m_index, Geschwind DH ranked first with h_index value of 27, g_index value of 30 and m_index value of 2.25%.Sanders SJ ranked second with h_index of 19, g_index of 19, and m_index 1.5%, Lord C ranked third with h-index value of 18,g_index value of 19, m-index value of 1.5% (Table 6).

Table 6: Author-wise

Author	h_index	g_index	m_index	TC	TP	PY
GESCHWIND DH	27	30	2.25	9971	30	2009

LORD C	18	19	1.5	7653	19	2009
SANDERS SJ	19	19	1.9	8241	19	2011
DALY MJ	16	18	1.778	7404	18	2012
BUXBAUM JD	18	18	1.5	8700	18	2009
DEVLIN B	18	18	1.5	11300	18	2009
DAWSON G	17	17	1.417	8243	17	2009
COOK EH	15	15	1.25	8735	15	2009
ROEDER K	15	15	1.364	8526	15	2010
EICHLER EE	14	14	1.273	7452	14	2010

Note: TP=Total Publications, TC=Total Citation, PY=Year Published

Author Collaboration Map

Selected Co-authorship from types of analysis and Authors from a unit of analysis.The selected fractional method in counting method criteria. Selected minimum number of documents of the authors were 4. There was a total of 3387 authors and 71 met the thresholds. For each of the 71 authors, the total strength of the co-authorship links with other authors was calculated. The authors with the greatest total link strength were selected. Total Item was 71, cluster, 14, links 171 and total link strength were 140.50(see Fig.1).
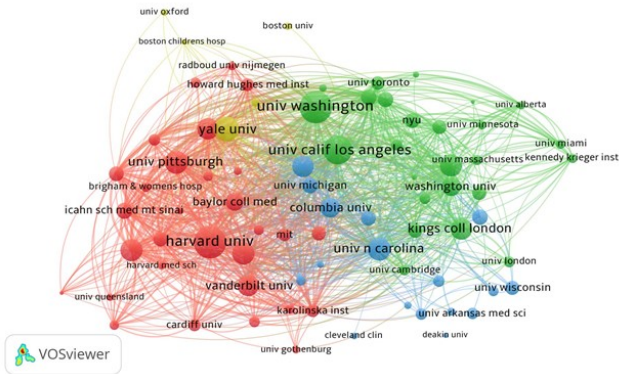
Fig.1: Author Collaboration Map
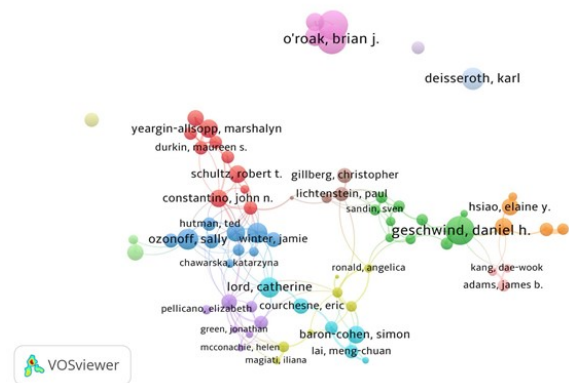
Organization Collaboration

Selected Citation from types of analysis and Organization from a unit of analysis.The selected fractional method in counting method criteria. Selected minimum number of documents of organizations were 7. There were total 1080 organization and 77 organization met the thresholds.

The total strength of the co-authorship links with other authors has been calculated for each of the 77 organizations. Authors with the highest

Overall link strength were selected. Total Item 77, cluster 4, links 2400 and total link strength 21179 (see fig.2).

Fig.2: Organization Collaboration

Source Collaboration

Selected Citation from types of analysis and sources from a unit of analysis.The selected fractional method in counting method criteria. Selected minimum number of documents of sources were 4. A total of 226 sources were identified and 41 sources met the thresholds. The total strength of the co-authorship links with other authors was calculated for each of the 41 sources. Authors with the highest overall link strength were selected. Total item was 41, cluster 4, link 424 and total link strength was 1799 (see fig.3)

Fig.3: Source Collaboration
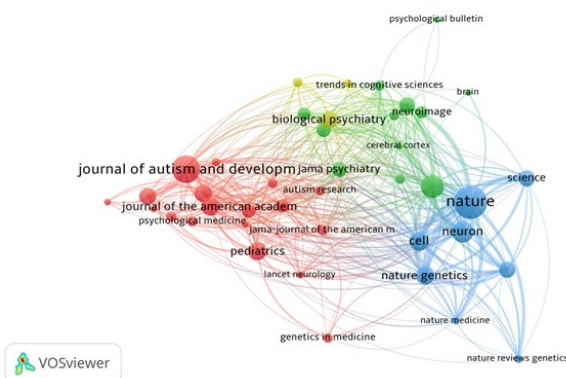
Source-wise

Nature journal (IF2018=43.073) published the highest number of articles (41) on ASD with h-index 41,g-index 41,m-index 3.42 and highest number of citation is 22152, followed by Journal of Autism and Developmental Disorders with a total article published 31,

Total citation 6239,h-index 28,g-index 31 and m-index 2.33. The third most productive source of publication was Molecular Psychiatry(IF11.973) with 24 articles and total citation 3381,h-index 22,g-index 24 and m-index 2.44.Further followed by Neuron(IF14.403) published total articles 21(with h-index 21,g-index 21,and m-index 1.91) and total citation is 5962.There were small numbers of articles published Cell 18, Journal of the American Academy of Child and Adolescent Psychiatry, Nature Genetics, and Pediatrics 17 similarly, Biological Psychiatry, and Journal of Child Psychology and Psychiatry i.e. 16 similar manners (Table 7).

Table 7: Source-wise

Source title	h-index	g-index	m-index	TC	TP	IF(2018)
NATURE	41	41	3.42	22152	410	43.07
JOURNAL OF AUTISM AND DEVELOPMENTAL DISORDERS	28	31	2.33	6239	31	2.786
MOLECULAR PSYCHIATRY	22	24	2.44	3381	243	11.973
NEURON	21	21	1.91	5962	213	14.403
CELL	18	18	1.64	6802	186	36.216
JOURNAL OF THE AMERICAN ACADEMY OF CHILD AND ADOLESCENT PSYCHIATRY	17	17	1.55	3211	17	6.391
NATURE GENETICS	17	17	1.70	7323	175	25.455
PEDIATRICS	17	17	1.42	6146	17	5.417
BIOLOGICAL PSYCHIATRY	16	16	1.45	2571	16	11.501
JOURNAL OF CHILD PSYCHOLOGY AND PSYCHIATRY	16	16	1.33	1778	16	11.501

Note: TC= Total Citation, TP= Total Publication

Highly Cited Document-wise

The article which received the highest citation was A general framework for estimating the relative pathogenicity of human genetic variants authored by Kircher M, source title Nature Genetics published in 2014 with (TC = 2276; U2 = 250). Followed by second-highest citation was Identification of risk loci with shared effects on five major psychiatric disorders:

A genome-wide analysis by Smoller JW and published in 2013 in Lancet journal with TC = 1505; U2 = 428. Further followed by third most highly cited document was Consensus statement: chromosomal microarray is a first-tier clinical diagnostic test for individuals with developmental disabilities or congenital anomalies and authored by Miller DT in 2010 in American Journal of Human Genetics with a total citation is (TC = 1307; U2 = 113).

The most usage count (since 2013) article was Microbiota modulate behavioural and physiological abnormalities associated with neurodevelopmental disorders and authored by Hsiao EY in 2013, that is, (U2 = 535). Followed by Identification of risk loci with shared effects on five major psychiatric disorders: a genome-wide analysis authored by Smoller JW and published Lancet in 2013, that is, (U2 = 428). Furthermore, followed by Genetic relationship between five psychiatric disorders estimated from genome-wide SNPs authored by Lee SH and published Mature Genetics in 2013, that is, (U2 = 407) (see Table 8).

Table 8: Highly Cited Document-wise

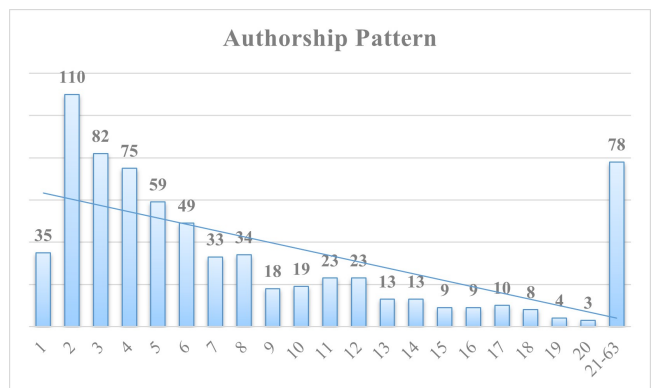| Title	Author	Source title	TC	U2	PY
A general framework for estimating the relative pathogenicity of human genetic variants	Kircher m	Nature genetics	2276	250	2014
Identification of risk loci with shared effects on five major psychiatric disorders: a genome-wide analysis	Smoller jw	Lancet	1505	428	2013
Consensus statement: chromosomal microarray is a first-tier clinical diagnostic test for individuals with developmental disabilities or congenital anomalies	Miller dt	American journal of human genetics	1307	113	2010
Parvalbumin neurones and gamma rhythms enhance cortical circuit performance	Sohal vs	Nature	1280	292	2009
Schizophrenia	Van os j	Lancet	1238	272	2009
Functional impact of global rare copy number variation in autism spectrum disorders	Pinto d	Nature	1212	316	2010
Sporadic autism exomes reveal a highly interconnected protein network of de novo mutations	O'roak bj	Nature	1200	224	2012
Microbiota modulate behavioural and physiological abnormalities associated with neurodevelopmental disorders	Hsiao ey	Cell	1147	535	2013
Genetic relationship between five psychiatric disorders estimated from genome-wide SNPs	Lee sh	Nature genetics	1075	407	2013
Large-scale brain networks and psychopathology: a unifying triple network model	Menon v	Trends in cognitive sciences	1090	269	2011

Note: TC= Total Citation, U2= Usage Count (Since 2013), PY= Year Published

Authorship publications

Fig.4 demonstrated the authorship publications of the articles. There were two authors' contributions 110 articles, followed by three author's contributions (82) articles. It is followed by three authors (82), four authors (75), five authors (59), six authors (49), single-author contributions (35) articles. Furthermore, followed by eight authors (34), 7 authors (33), 11 and 12 authors (23), ten authors (19), nine authors (18), thirteen and fourteen authors (13), seventeen authors (10), seventeen authors (10), eighteen authors (8) and 19-20 authors (4,3). A small number of articles were published by 21-63 authors were 78 articles.

Fig. 4: Authorship Pattern

Authorship Pattern

Findings of the study

The main findings of the present study are: it is revealed that a total

Of 8864 authors were published 707 articles and average citations per documents, that is, 236.3%. It was found that the maximum number of articles (80) was published. By 2016 it had accumulated more than 10,277 citations, MeanTCperArt (128.46%), MeanTCperYear (32.12%), and CY (4) to the total number of articles. The study also shows that five document types were found in these 707 publications, Article (441) was the most frequent form of publication. The study finds out that while the USA takes top position with its contribution 482 (TC = 125751), and UK 173 (TC = 40395) which stands second among the top contributors. The King's College London, the publication number of which is 62, ranked first, the most citations (12759), and the total citation ranked 10 were acquired. the study noticed that Geschwind DH was the most productive author, with h_index27,g_index 30, m-index 2.25% (30 articles) of total publications published (30 articles; 7771 citations) in 2009. Selected Co-authorship from types of analysis and Authors from the unit of analysis. The selected minimum number of documents of the authors was 4. A total of 3387 authors were identified and 71 met the thresholds. The total strength of the co-authorship links with other authors was calculated for each of the 71 authors. The minimum number of documents of the organizations selected was 7. There were a total of 1,080 organizations and 77 organizations met the thresholds. The total strength of the co-authorship links with other authors has been calculated for each of the 77 organizations. The selected fractional method in the criteria of the method of counting. The minimum number of source documents selected was 4. A total of 226 sources were identified and 41 sources met the thresholds. The total strength of the co-authorship links with other authors was calculated for each of the 41 sources. The authors with the highest overall link strength were selected. The total item was 41, cluster 4, link 424, and total link strength were 1799.

Therefore, we found that the highest impact factor journal was Nature, that is, IF43.070. The Second most highly Impact Factor journal was Cell, that is, IF36.216. The Third most highly Impact Factor journal was Nature Genetics, that is, IF25,455. The most significant paper, written by Kircher M, source title Nature Genetics reported with (TC = 2276; U2 =

250), was a general framework for estimating the relative pathogenicity of human genetic variants. The most usage counts (since 2013) article was Microbiota modulate behavioural and physiological abnormalities associated with neurodevelopmental disorders authored by Hsiao EY in 2013, that is, (U2 = 535). Finally, this study also found that there were two authors' contributions to 110 articles.

Conclusion

The analysis was carried out with the help of the literature from the Web of Science Database. The analysis focuses on how the patterns in science have grown in the year wise frequency between 2009 and 2019 in publications and citations. The 8864 authors wrote a total number of 707 articles related to ASDs. Article (441) was the most frequent form of publication. The most frequent documents like Article, it was Web of Science Core Collection Times Cited Count (108541) with Usage Count (Last 180 Days) (2958), Usage Count (Since 2013) (33769). The study finds out that whilst the USA takes the top position with its contribution. The King's College London, the publication number of which is 62, ranked first, the most citations (12759). Geschwind DH was the most productive author published (30 articles; 7771 citations) in 2009. There is also a need to increase funding for research in this area and related fields. This study shows that there is no far-reaching knowledge in the field of autism research compared to other medical science research in the world.

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