

**ANALYSIS OF SCHOLARLY COMMUNICATION OF VOICE: A
SCIENTOMETRIC STUDY**

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SEPTEMBER 2021**

CERTIFICATE

This is to certify that this dissertation entitled — “**Analysis of Scholarly Communication of Voice: A Scientometric Study**” is a bonafide work submitted in part fulfillment for degree of Master of Science (Speech-Language Pathology) of the student Registration Number: 19SLP003. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled — “**Analysis of Scholarly Communication of Voice: A Scientometric Study**” is the result of my own study under the guidance of Dr. R. Rajasudhakar, Associate Professor, Department of Speech-Language Sciences, All India Institute of Speech and Hearing, Manasagangothri, Mysuru-570006 and has not been submitted earlier to any other University for award of any other Diploma or Degree.

Mysuru,

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September 2021

*Dedicated to
My Mom, Dad,
Medha, Yuki,
Thatha, Jean, &
Well Wishers*



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CHAPTER I

INTRODUCTION

The field of scientometrics focuses on analyzing 'the quantitative aspects of the generation, propagation, and utilization of scientific information' (Braun, Errío, & Schubert, 1987). Nalimov gave the term scientometric in Russia. Since Nalimov coined the Russian version of the term "scientometrics" (naukometriya) in 1969, the term has increased in popularity and is now used to denote the study of science, including growth, structure, interrelationships, and productivity (Hood & Wilson, 2001).

Over the years, many researchers have used scientometric analysis to find the growth of research in a particular field or subjected journals to this type of analysis to find the collaboration between authors, year-wise productivity, country-wise productivity, and authors' contribution to specific fields. The most common type of study under bibliometrics/scientometrics is analyzing the Journal's scientific output. Scientometrics investigates scientific execution by statistical techniques based on publications of a journal. It is one of the quantitative ways to analyze the articles published in a specific journal.

Sadik & Chaturbhuji (2019) studied scholarly communication on Phonology during 2000-2017 from different publications like articles, book reviews, reviews, proceeding papers, book chapters, letters, and reprints. The outcome parameters were analyzed using a statistical tool, and the parameters considered were collaborative index, relative growth rate, collaboration co-efficient, and degree of collaboration. They found that single-authored publications were more prominent than multi-

authored. They also found that the collaborative index was low, meaning the collaboration was less in the field of Phonology. They also found that the USA had the most percentage of publications in this field.

Ramkumar et al. (2016) examined the collaborative trend in three selected journals on speech, language, and hearing sciences. The selected leading three journals considered by the authors were Journal of Speech, Language and Hearing Research (JSLRH), published by American Speech and Hearing Association (ASHA), Asia Pacific Journal of Speech, Language and Hearing (SLH), and Journal of the All India Institute of Speech and Hearing (JAIISH) in the field of speech, language, and hearing. It was reviewed from 2009-2013. They used scientometric tools such as degree of collaboration, collaboration index, collaborative coefficient, and Modified collaborative coefficient. Additionally, they had added the Local collaborative index, domestic collaborative index, and International collaborative Index as a parameter for analysis. Journal-wise, subject-wise, and authorship pattern analyses were carried out. They found that the number of papers published linearly increased in the journals between 2009-2013. The collaborative index was high, which suggested that most of the articles were collaborative in nature. In the subject-wise analysis, they found that the number of articles published in Language was higher than Speech and Hearing subjects. They also found that local collaborations were higher compared to Domestic and International collaborations.

There is a need to confer an overall view of the trend in a particular research field. It also helps the researchers to identify the research gaps or the field in which more research is required. For example, whether a specific technique is used more often and has much evidence-based practice. Further, this study would help in understanding the position at which our Indian research is heading. It would also help

understand the collaborating patterns of the authors and identify who the researchers are, i.e., whether the research is carried out by surgeons, doctors, speech-language pathologists, audiologists, and so on.

The present research would help researchers identify the research gap and choose areas of relevance and importance in Voice sciences and disorders. Future researchers, students, or authors can choose topics based on the research gap where minimal work is carried out. There has been no research done on the quantitative analysis of the content published in the field of 'Voice'.

Aim of the study

The aim of the present study was to determine empirically the trend of research content in the field of Voice (such as the number of publications, number of citations, collaborative patterns, and distribution of publication). It also aims to determine the country-wise and author-wise productivity of articles on the select Journal, i.e., Journal of Voice, during 2019 and 2020.

Objectives

- To quantify the topic-wise distribution of publication of articles in Journal of Voice between 2019 (Jan to Dec) and 2020 (Jan to Dec)
- To examine the nature of the authorship pattern of the articles in Voice
- To recognize Country-wise distribution of articles in Voice
- To identify the funding agencies
- To quantify the year-wise distribution of publication and growth of literature between 2019 (Jan to Dec) and 2020 (Jan to Dec) in Journal of Voice

CHAPTER II

REVIEW OF LITERATURE

The review of literature is divided into three sections. The first section focuses on world scientific collaboration. The second section focuses on Audiology, Phonology, singing voice, disorders such as Asperger syndrome and Dementia, and the use of Virtual reality (VR) technology in rehabilitation. The final section focuses on the project output of AIISH's research grant projects and the growth of different journals.

Gazni, Sugimoto, and Didegah (2012) analyzed the documents published in the Web of Science (WoS) database for mapping the collaborative patterns across countries and fields from 2000 to 2009. The authors found a total of 1,39,17,488 documents. They categorized the documents using Essential Science Indicators (ESI) into 22 fields and categorized journals broadly into five fields (Life sciences, Social sciences, Physical sciences, Medicine, and Multidisciplinary).

They reported growth of multi-authored papers from 69% to 78%. The number of authors per paper also increased from 3.3 to 4.1 authors. The majority of the publications consisted of 1-3 authored documents (57%). Life sciences showed high levels of co-authorship, whereas Social sciences showed a low co-authorship pattern. Collaboration between institutions increased from 39% to 48%. The collaboration of authors within the same institute was around 56%. The field of Space science preferred collaboration between institutions. The international collaboration grew from 14% to 18%. The field of Physics and Mathematics preferred multi-national collaboration.

The USA contributed 30% of the world's publications, and 20% is due to international collaboration. The USA, UK, Germany, France, Italy, and Canada are the centers in the network of international collaboration. They also found that countries with high incomes had more publications in multi-national collaboration. The multidisciplinary field had the highest percentage of international publications.

Nandeesha & Begum (2017) analyzed documents from the Web of Science (WoS) database in the field of Audiology from 1989 to 2016. The total number of documents compiled by the authors in the field of audiology was 1382.

Out of the data collected, authors reported that the Scientific articles with 1180 (85%) records were the highest type of documents, followed by Conference proceedings with 93 (7%) in number. They found an increase in the number of publications from 1989 with 5 to 2016 with 144 publications. Further, the authors reported that citations increased from 0 in 1989 to 1739 in 2016. Among the authors who published in this field, Prof De Wet Swanepoel ranked first with 20 publications, followed by an anonymous author with 18 publications. Under institution-wise productivity, the University of Pretoria stood first with 32 publications. In country-wise productivity, it was reported that the USA ranked first with an output of 507 (36.69%) papers. England, Germany, Australia, and Canada were among the top 5 countries with the highest productivity. The authors also reported that most of the documents were published in English (1284 documents), followed by German (79). Other languages like Portuguese, Spanish, Turkish, French, and Polish were also used. They also ranked the journals based on productivity, and the International Journal of Audiology ranked first with 135 publications, followed by the Journal of The American Academy of Audiology with 99 publications. Under research areas of audiology, Otorhinolaryngology is first followed by Audiology & Speech-Language Pathology

with 815 and 410 publications, respectively. They also reported that the National Institute of Deafness and other Communication Disorders, National Institute of Health (NIDCD NIH), ranked first by funding 23 publications.

Batcha & Chaturbuj (2019) studied the collaboration and authorship patterns in the field of Phonology. They chose a duration of 18 years, i.e., from 2000 to 2017, and collected data from Web of Science (WoS). They found a total of 5015 records. They used scientometric indicators, i.e., Collaboration index, degree of collaboration, Collaborative coefficients, Modified collaborative coefficients, Relative growth rate, and Doubling time, and subjected the obtained data for analysis.

They reported that Scientific articles were the highest number of documents with 4019 records, followed by book review and paper proceeding with 397 and 214 records, respectively. They found a gradual increase in the research output from 2000 to 2017 by 5.82%. It was observed that single authors and two authors authored 41.81% (2097) and 23.39% (1173) of the articles. The highest collaborative index was in the year 2012 with 2.70. They also reported that the mean degree of collaboration was 0.57. In the year 2013, the degree of collaboration was the highest, with 0.63. The average collaboration coefficient and modified collaboration coefficient were similar (0.36 and 0.37, respectively). The average relative growth was 0.07, and the mean Doubling time was 0.044 in 18 years. The highest-ranking author was Usha Goswami with 34 records and was followed by Iris Berent with 33 records. The leading Journal in the field of Phonology was *Lingua* with 192 articles, followed by *Clinical Linguistics and Phonetics* with 111 articles. They also found that the USA was the leading country with the most significant number of articles published (1928), followed by the UK with 1302 published articles.

They concluded that in the field of Phonology, articles authored by single authors were more common. Hence, the collaborative coefficient was less than 0.5, and the modified collaborative coefficient was 0.37.

Pestana et al. (2019) studied the trend of singing voice from 1949 to 2016 using text mining, clustering, and scientometric approaches. The authors collected the data from the PubMed database and divided the results into the first period (1949-2010) and the second period (2011-2016). The total number of articles published in this field was 754 articles.

They reported that the number of articles published in this field increased from 1949 to 2016; in the second period, the total number of articles found was 225 articles. They also found that the number of articles published in each decade increased consistently. They also reported that 162 Journals published articles related to the singing voice. It was also observed that the Journal of Voice had the highest number of published articles in both periods. They also reported that the most researched topic until 2010 was the professional singer and focused more on opera singers. The focus shifted to studying male singers and from studying the organic structure to the functional aspects of the singing voice.

They concluded by saying that the research in singing voice has evolved, the number of articles published in this field has increased, and the research in the functionality aspects was given more importance.

Lorenzo et al. (2016) used bibliometric indicators to study the evolution of the research topic on 'Asperger's syndrome' between 1990 to 2014. They collected data from various databases such as Web of Science, Medline, Inspec, Biosis Citation

Index, SciELO Citation Index, and Current Contents Connect. 3452 were the total number of Scientific articles obtained on this topic.

They reported that the research output continuously grew in this field. From 1990 to 2001 and 2003 to 2014, there was an increase in the number of articles. However, a decrease was observed in scientific output in 2002. According to the authors, five hundred seventy-four existing journals published papers on this theme, out of which the Journal of Autism and Developmental Disorders covered 17.14% of the publications. The average number of pages of the articles published in the Journal was ten pages long. In author collaboration, 65% of the data obtained were due to articles written by 2,3,4, and 5 authors. It was also observed that ten or more authors collaborated on 126 papers. The citations received for the articles varied from 0 to 1083. A gradual increase was observed in the number of citations from 1990. The most productive author was Baron Cohen, with 143 papers and among his work. Three articles received citations between 708 to 1083. Asperger thematic field was mainly published under the area 'Psychology' and 'Behavioural Sciences' with 2730 papers. The USA was the most productive country in this field, followed by England, as reported by authors. They concluded that most articles published in this field are based on psychological study rather than education and pedagogical intervention.

Asgar, Cang, & Yu (2017) studied the recent research activities on Assistive Technologies (AT) for people with Dementia. They considered the articles from 2000 to 2014. They considered the data from Scopus and Citation databases. They collected a total of 1902 publications and subjected them to bibliometric/scientometric analysis.

They reported an overall increase in the research output on AT-related research with an average annual growth of 29%. The USA took the first rank with 503 publications,

followed by the UK with 399 publications in country-wise productivity. Even in collaborative research publications, the USA took the first rank, followed by the UK. To check for the quality of publications, they used several parameters like the average number of citations (C), P-Index which gives a balance between the quantity and quality of the publications where quantity is calculated by citations (C) and quality by the ratio of C/P, P is the total number of publications and H-index, an author-metric which indicates the productivity and the number of citations per article. The USA had the highest P-Index with 44.73 and a good C value of 13.34. It was noted that Germany, even with fewer publications, had the best C value of 16.43 and a high P-Index value of 30.09 because Germany published their articles in high-impact journals.

They also observed that different countries have different focuses on the topics related to AT research. The USA focuses on digital cities for the elderly. In contrast, the UK focuses on telecare, Germany focuses on assistance through activity monitoring, and Human-like communication assistive robots for emotional well-being in Australia. They also reported that countries like the USA, UK, and France have well-established national policies for Dementia. They also pointed out that eastern countries of the Asia Pacific had lesser output in this field, and these countries need to put more effort, as concluded by the authors.

Huang, Huang, Ali, Zhai, Bi, & Liu (2016) analyzed the articles related to the use of virtual reality in rehabilitation. The articles were collected between 1st January 1996 to 31st December 2015 from PubMed, Scopus, and Web of Science databases. A total of 15,191 documents were found related to this topic. In these documents, Scientific articles (7341) were the most common document, followed by conference

papers (5303). These articles were published under 27 different subject areas. Authors reported that there was an increase in the articles from 32 in 1996 to 2239 in 2015.

A total of 101 countries contributed to the research. Among these countries, the USA stood first with 4522 articles, followed by the UK with 1369 articles. North America and Europe lead the research by contributing more to this area of research. The articles were published in 25 different languages. With 14,697 articles, the English language is the most used language for publication. Journal with the most output was *Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics* with 527 articles. One hundred sixty institutions contributed to the data collected in which *Eidgenossische Technische Hochschule Zurich, Switzerland*, ranked first with 208 articles. Among the top 10 institutions for highest productivity, four were in the USA, 2 in Canada and Italy, and 1 in Switzerland and Israel. Riva Giuseppe (Italy) was the most productive author with 170 articles. The article titled 'Brain-computer interfaces for communication and control' was cited 3223 times which is the highest citation an article has received. The authors added that Medicine, Computer Science, and Engineering are the subject areas in which most of the articles were published. The authors concluded that VR technologies are a new hotspot for research in rehabilitation medicine and are currently being used in specific assessment and treatment tools.

Ramkumar and Narayanasamy (2017) studied the collaboration and networking of the research grant projects in the domain of Speech, Language and Hearing Sciences. The authors considered the research grant projects from 2001-02 to 2015-16, mentioned in the Annual report of All India Institute of Speech and Hearing, Mysore. For ease of analyzing the data, they divided the data into two groups consisting of projects with seven years each and named it Span I (2001-02 to 2007-

08) and Span II (2009-10 to 2015-16). The data consisted of a total of 211 Research projects.

The authors reported that the number of projects grew from Span I to Span II by a factor of 3.39. The highest and lowest ARF projects were in 2011-12 and 2001-02 with 38 and 4, respectively. The authors categorized the data domain-wise to check the productivity in each domain. In Span I, Speech ranked first with 18 projects, and in Span II, Language ranked first with 47 projects. Two-authored projects were the typical investigator's pattern in both Spans I and II with 19 and 74 projects, respectively.

Interestingly, authors also found that single-authored projects declined from 31.25% (span I) to 17.17% (span II). Collaborative co-efficient improved from 0.40 to 0.49, which demonstrates an increasing pattern in collaboration. They reported that local collaborations were the highest type of collaboration with 137, and the least was an international collaboration with nine projects. Overall, there is an increase in the domestic and international types of collaboration in the span of 14 years. Most international collaborators were universities from the USA, and Manipal College of Allied Health Sciences, Manipal, was the highest contributor to the domestic type of collaboration. Authors also reported that the pattern of professional networking was highest between junior and senior faculty (19.85%), followed by networking with clinical staff (15.81%).

They concluded that the growth in the output of research projects could be attributed to the increase in the number of faculty members. The flow of knowledge from seniors to juniors is enhanced with the type of pattern of professional networking

observed. They also suggested that some policies need to be implemented to improve the international type of collaboration.

Nandeeshha and Begum (2017) analyzed the research papers published in the Journal of All India Institute of Speech & Hearing (JAIISH) from 2010 to 2015. The authors studied the authorship collaboration, year-wise distribution of articles, ranking of authors based on research output, institution-wise publication, and subject-wise research productivity. The authors found a total of 155 articles in the analyzed six-year duration.

They reported that two and three authored papers were the highest with 55 papers and single-authored papers were five. Further, the authors found that the distribution of research articles was higher in 2010 with 34 papers, followed by 2013 with 31 articles. Four hundred fifty authors contributed one hundred fifty-five papers, and N Sreedevi has the highest number of articles published (14 articles) and is considered the highest-ranking author. With 12 articles, S P Goswami secured the second rank, and Pushpavathi M published 11 articles and secured the third rank. Regarding Institution-wise productivity, All India Institute of Speech and Hearing ranked first with 302 authors, and JSS Institute of Speech and Hearing ranked second with 19 authors who contributed to the Journal. For subject-wise research productivity, the Speech category had the highest number of papers (51), followed by Language and Hearing with 45 and 30 papers, respectively. Only two papers were published under the communication category.

The authors concluded that there are very few articles on author collaboration and research productivity in the field of speech and hearing. They chose JAIISH because the All India Institute of Speech and Hearing (AIISH) is a fifty-year-old institute and

one of its kind in India, and it is the one and only Journal of AIISH. They also state that the scope of the study is limited to JAIISH. The result of the study indicated that the bibliometric and scientometric patterns of speech and hearing fields are similar to other subjects.

Ramkumar, Narayanasamy, & Nageswara (2016) analyzed three specific Journals from 2009 to 2013 to understand the collaborative trends in Speech, Language, and Hearing sciences. Journal of Speech, Language, and Hearing Research (JSLHR) published by American Speech and Hearing Association (ASHA), Asia Pacific Journal of Speech, Language and Hearing (SLH), and Journal of All India Institute of Speech and Hearing (JAIISH) were the three journals considered as the database for this study.

They reported that a total of 905 documents were published. The highest number of publications were from the Journal, JSLHR with 648 documents, followed by JAIISH with 146, and at last, was SLH with 111 documents. All the journals showed an increase in the number of publications from 2009 to 2013. Overall, Multi-authored papers were the highest, with 320 papers. In JSLHR, multi-authored papers were the trend, and in JAIISH and SLH, three-authored papers were the highest. The degree of collaboration for all three Journals was above 93%. Overall, more articles were published in the Language domain (39.78%), followed by the Speech domain (36.91%) and Hearing (21.44%). The three Journals followed the above similar trend. In nature of collaboration, Local was 366 papers; Domestic was 344 papers, and International was 132 papers. In JAIISH and SLH, similar trends were observed, but in JSLHR, Domestic collaboration was reported to have the highest output, followed by Local and International collaboration. They concluded by stating that collaborative trends are observed in Speech, Language, and Hearing sciences, too, like other fields.

Kumar and Swamy (2016) conducted a bibliometric analysis on the Journal of All India Institute of Speech and Hearing (JAIISH) from 1970 to 2015. The authors studied the volume-wise content, authorship pattern (author gender, collaborative authorship, level of collaboration, most prolific author, and organizational affiliations), and the research domains of the Journal. Thirty-four volumes were published between 1970 to 2015 in JAIISH. The obtained data from these volumes were divided into a) Early years of publication [EYP - 1970 to 1994] and b) Later years of publication [LYP - 2007 to 2015] because the publication of the Journal stopped between 1994 and 2007.

The authors reported that 787 pieces of information were published, and the major constituents were scientific articles (502 is the number; 63.78%). Two hundred and eighty-seven documents were from EYP, and two hundred and fifteen were from LYP. They also noted that PG dissertation abstracts were published in EYP. One thousand twenty-six authors published in JAIISH, out of which 51% and 49% were the percentages of male and female authors, respectively. In EYP, male authors and LYP, female authors contributed more. From 502 scientific articles, 303 were collaborative in nature. Among the collaborative articles, 2-authored articles (142) were the highest in number. The collaborative authorship increased from EYP to LYP. They also found that international collaboration was the least with 15 articles, and local collaboration was the highest with 223 articles. They ranked the authors of Scientific articles based on the number of articles published and found that Nataraja NP had the highest number of articles published (26 articles) in EYP and Pushpavathi M had the maximum number of articles (18) in LYP. The majority of authors who published in JAIISH were affiliated with the All India Institute of Speech and Hearing (673 nos). The rest were affiliated with 125 other institutions, and 30 authors were

affiliated to foreign institutions published in JAIISH. They also found that the highest number of articles were published under the speech domain, followed by hearing, then language, and at last were in the multidisciplinary domain.

They concluded by reporting a change in the content published in the Journal from EYP to LYP, i.e., PG dissertation abstracts were not published anymore in the LYP. They also found that the collaborative patterns increased, the collaboration between institutions at the national and international level increased. The total number of articles published in the speech and language domain increased and decreased in hearing and multidisciplinary domains.

The literature review indicates an increase in the number of articles being published and collaborations in Journals and specific fields in recent years. There are many sub-fields in Speech, Language, and Hearing Sciences in which scientometric studies have not been carried out till date. There is a need to confer an overall view of the trend in a particular research field. It also helps the researchers to identify the research gaps or the field in which more research is required. For example, whether a specific technique is used more often and has much evidence-based practice.

CHAPTER III

METHOD

Material

The information was collected from the select Journal, i.e., Journal of Voice. Each article's detail was collected from the Journal within the timeline from January 2019 to December 2020. The database for selecting articles was from the E-Journal facility provided by the Library and Information Centre of All India Institute of Speech and Hearing (AIISH), Mysore, which allowed the researcher to check for articles. The online version (soft copy) of the Journal's published articles was considered for this study.

Procedure

Information was collected by going through each article individually and organized, tabulated, and segregated issue-wise. Microsoft Excel sheet was used for the systematic segregation and tabulation of data.

Analysis

The articles were segregated based on the following parameters;

(a) *The number of articles*: the total number of articles of each issue of the Journal,

(b) *Document/Article type*: Scientific articles (SA), Reviews [(RW) which contains systematic reviews, literature reviews and book reviews] and Letter to the editor & reply to the editor (TE & RE) were considered under this,

(c) *Title of the article*,

(d) *The names and number of authors* (authorship pattern and author-wise productivity),

(e) *The country from which the authors are* (Country-wise productivity),

(f) *Collaboration* from different institutes (Collaborative pattern): local collaboration (within the same institute or the same state/province), national collaboration (between two or more states/provinces), and international collaboration (between two countries),

(g) *Topic-wise distribution of article* such as Voice sciences (articles related to non-SLP assessment like vocal fold visual examination through direct laryngoscopy, CT scan, MRI scan, etc., and animal studies), Voice medicine (articles containing pharmacological options), Voice surgery (articles including novel surgery techniques, outcomes of surgical techniques and evaluation of surgical techniques on excised larynges), simulated/model studies (articles which uses theories, algorithms and simulations), SLP's voice assessment [articles containing aerodynamic, acoustic, perceptual and self-rating scales(Voice Handicap Index, GRBAS, and Voice Related Quality of Life measurements)], SLP management (articles containing outcomes of different therapy techniques, use of a therapy technique on different disorders and direct/indirect therapy outcomes), combined treatment effects (articles which contain surgery and medication, and medical and non-medical management) and others (articles related to personality, factors affecting the appointment schedule, and cost analysis, letter to the editor and reply to the editor),

(h) *The type of participants* [Human, Non-human (articles involving animals), both (human and non-human) or Not applicable (review articles, articles with algorithms, simulations)],

(i) *Age group of the participants* [Not specified (articles with human participants whose age is not mentioned), Paediatric (1-12 years), Adults (12.1-55 years), and Geriatrics (>55 years)],

(j) *The number of citations* of the article (it was determined using the web search engine called Google Scholar),

(k) *Funding source* for the research article (List of funding agencies and top three agencies were ranked based on the number of articles funded), and

(l) *Research trends* in voice disorders (issue-wise analysis on the number of articles was done for each year and compared between 2019 and 2020).

Scientometric tools

Collaboration Index (CI)

The average number of authors per joint paper is used to calculate the Collaboration Index (Savanur & Srikanth, 2010). Single-authored papers are always excluded from the collaboration index analysis. So, for CI, the formula is $CI = (\text{Total author}) / (\text{Total joint paper})$. The statistical formula for Collaboration Index is,

$$CI = \frac{\sum_{j=1}^A j f_j}{N}$$

Where f_j is the number of j authored papers, j is the number of authors, and N is the total number of research papers.

Degree of Collaboration (DC)

The ratio of collaborative research papers to the overall number of research publications in a discipline over a given period is known as the degree of collaboration (Subramanyam, 1983). The formula for Degree of Collaboration is,

$$DC = \frac{Nm}{Nm + Ns}$$

Where Nm is the number of multi-authored papers, and Ns is the number of single-authored papers.

Collaborative Co-efficient (CC)

The collaboration co-efficient is a measure of research collaboration that takes into account both the average number of authors per publication and the percentage of multi-authored papers (Ajiferuke et al., 1988). The equation to calculate the CC is,

$$CC = 1 - \frac{\sum_{j=1}^A \left(\frac{1}{j}\right) f_j}{N}$$

Where f_j is the number of j authored papers, j is the number of authors, and N is the total number of research papers.

Statistical analysis

The data pertaining to the articles were tabulated and analyzed using SPSS software (version 20). All the parameters were measured in terms of frequency and percentage.

CHAPTER IV

RESULTS

In this chapter, the results obtained from the Journal of Voice were discussed. The Journal of Voice publishes its issues once in two months each year, and the total issues for each year are six (6). In this study, a total of twelve issues (2019 and 2020) were analyzed.

4.1 The number of articles

The total number of articles obtained from the Journal was four hundred and twenty-six. In 2019, the total number of articles published was two hundred and ten, and the September issue had 67 (32%) articles, which was the highest. In 2020, the total number of articles published was two hundred and sixteen, and the January issue had 42 (19.4%) articles, which was the highest. Table 1 depicts the total number of articles of each issue in the year 2019, and table 2 depicts the total number of articles of every issue in the year 2020.

Table 1

Total number of articles in the year 2019

| Year and Issue | No of articles (N, %) |
|-----------------------|------------------------------|
| 2019, Jan-01 | 25 (12%) |
| 2019, Mar-02 | 24 (11.4%) |
| 2019, May-03 | 25 (12%) |
| 2019, July-04 | 38 (18%) |
| 2019, Sept-05 | 67 (32%) |
| 2019, Nov-06 | 31 (14.6%) |
| TOTAL | 210 |

Table 2

Total number of articles in the year 2020

| Year and Issue | No of articles (N, %) |
|-----------------------|------------------------------|
| 2020, Jan-01 | 42 (19.4%) |
| 2020, Mar-02 | 26 (12%) |
| 2020, May-03 | 39 (18%) |
| 2020, July-04 | 31 (14.5%) |
| 2020, Sept-05 | 40 (18.5%) |
| 2020, Nov-06 | 38 (17.6%) |
| TOTAL | 216 |

4.2 Document/Article type-wise distribution

In the year 2019, out of the 210 published documents, 195 (92.9%) were Scientific articles (SA), 12 (5.7%) were Review articles (RW), and 3 (1.4%) were Communication to the editor, i.e., Letter to the editor and Reply to the editor (TE & RE).

In the year 2020, out of the 216 published documents, 198 (91.7%) were Scientific articles (SA), 13 (6%) were Review articles (RW), and 5 (2.3%) were Communication to the editor, i.e., Letter to the editor and Reply to the editor (TE & RE).

Table 3 and Table 4 depicts the different document types of each issue in the year 2019 and 2020, respectively. In both the years, scientific articles rank 1st, Review articles rank 2nd, and letters to the editor and Reply to the editor articles are the last.

Table 3

Document/article type-wise distribution in the year 2019

| Year and Issue | SA | RW | TE & RE |
|-----------------------|--------------------|------------------|--------------------|
| 2019, Jan-01 | 19 (76%) | 4 (16%) | 2 (8%) |
| 2019, Mar-02 | 24 (100%) | 0 (0%) | 0 (0%) |
| 2019, May-03 | 22 (88%) | 3 (12%) | 0 (0%) |
| 2019, July-04 | 38 (100%) | 0 (0%) | 0 (0%) |
| 2019, Sept-05 | 62 (92.5%) | 4 (6%) | 1 (1.5%) |
| 2019, Nov-06 | 30 (96.8%) | 1 (3.2%) | 0 (0%) |
| TOTAL | 195 (92.9%) | 12 (5.7%) | 3 (1.4%) |

(Note. SA-Scientific articles, RW-Review articles, and TE & RE-Letter to the editor and Reply to the editor)

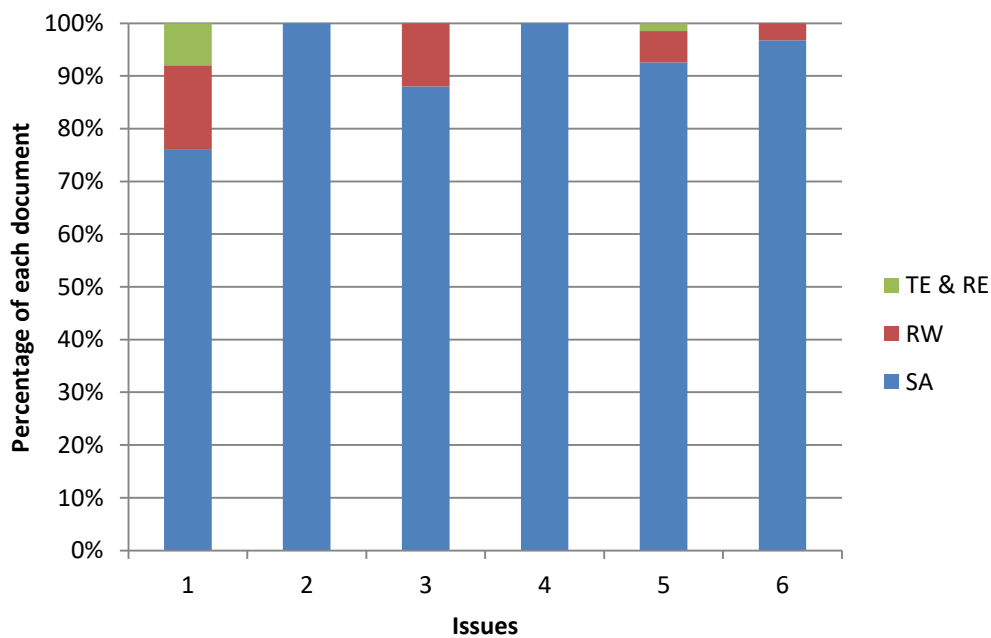


Figure 1: Issue-wise document type distribution (2020)

Table 4

Document/article type-wise distribution in the year 2020

| Year and Issue | SA | RW | TE & RE |
|-----------------------|--------------------|----------------|--------------------|
| 2020, Jan-01 | 37 (88.1%) | 3 (7.1%) | 2 (4.8%) |
| 2020, Mar-02 | 24 (92.3%) | 2 (7.7%) | 0 (0%) |
| 2020, May-03 | 39 (100%) | 0 (0%) | 0 (0%) |
| 2020, July-04 | 28 (90.3%) | 3 (9.7%) | 0 (0%) |
| 2020, Sept-05 | 37 (92.5%) | 2 (5%) | 1 (2.5%) |
| 2020, Nov-06 | 33 (86.8%) | 3 (7.9%) | 2 (5.3%) |
| TOTAL | 198 (91.7%) | 13 (6%) | 5 (2.3%) |

(Note. SA-Scientific articles, RW-Review articles, and TE & RE-Letter to the editor and Reply to the editor)

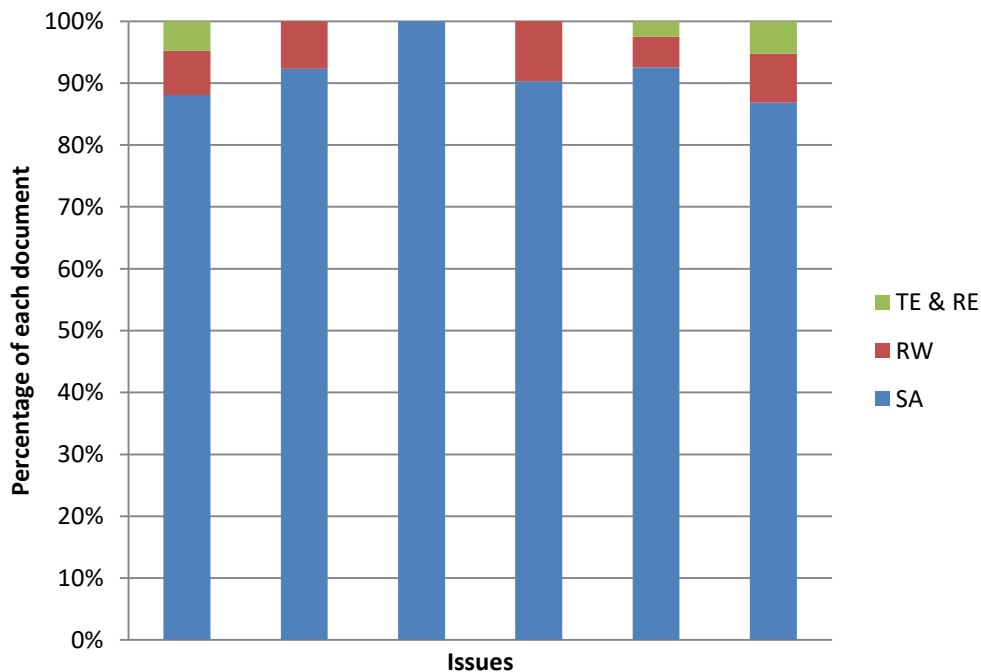


Figure 2: Issue-wise document type distribution (2020)

4.3 Authorship pattern

Articles were classified based on the number of authors. For this section, single author, two authors, three authors, and four or more authors were considered. Among the 426 articles, four or more authored articles ranked first with 260 (61%) articles, three authored papers ranked second with 86 (20.2%) articles, two authored papers ranked third with 60 (14.1%) articles, and single-authored paper ranked last with 20 (4.7%) articles. A similar pattern was observed where four or more authored articles ranked first with 133 (63.3%) and 127 (58.8%) articles in 2019 and 2020, respectively. Table 5 and Table 6 represents authorship pattern of the year 2019, and 2020, respectively.

Table 5

Authorship pattern in the year 2019

| Year and Issue | Single author | Two authors | Three authors | Four or more authors |
|-----------------------|----------------------|--------------------|----------------------|-----------------------------|
| 2019, Jan-01 | 5 (20%) | 4 (16%) | 5 (20%) | 11 (44%) |
| 2019, Mar-02 | 0 (0%) | 2 (8.4%) | 5 (20.8%) | 17 (70.8%) |
| 2019, May-03 | 0 (0%) | 1 (4%) | 5 (20%) | 19 (76%) |
| 2019, July-04 | 0 (0%) | 6 (15.8%) | 8 (21%) | 24 (63.2%) |
| 2019, Sept-05 | 3 (4.5%) | 7 (10.4%) | 16 (23.9%) | 41 (61.2%) |
| 2019, Nov-06 | 0 (0%) | 7 (22.6%) | 3 (9.7%) | 21 (67.7%) |
| TOTAL | 8 (3.8%) | 27 (%) | 42 (%) | 133 (%) |

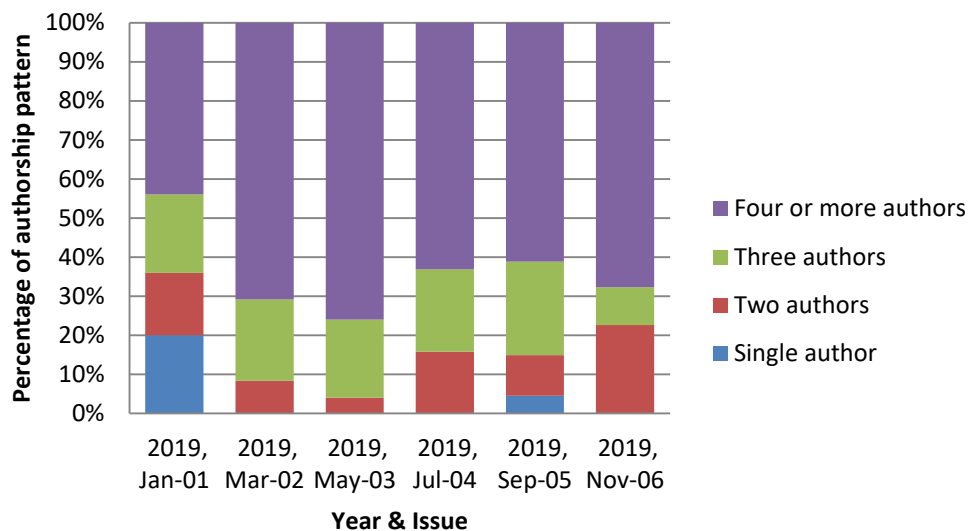


Figure 3: Authorship pattern by issue-wise (2019)

Table 6

Authorship pattern in the year 2020

| Year and Issue | Single author | Two authors | Three authors | Four or more authors |
|----------------|------------------|-------------------|-------------------|----------------------|
| 2020, Jan-01 | 3 (7.1%) | 8 (19.1%) | 12 (28.6%) | 19 (45.2%) |
| 2020, Mar-02 | 1 (3.9%) | 5 (19.2%) | 3 (11.5%) | 17 (65.4%) |
| 2020, May-03 | 0 (0%) | 3 (7.7%) | 8 (20.5%) | 28 (71.8%) |
| 2020, July-04 | 3 (9.7%) | 7 (22.6%) | 6 (19.3%) | 15 (48.4%) |
| 2020, Sept-05 | 3 (7.5%) | 5 (12.5%) | 7 (17.5%) | 25 (62.5%) |
| 2020, Nov-06 | 2 (5.3%) | 5 (13.2%) | 8 (21%) | 23 (60.5%) |
| TOTAL | 12 (5.5%) | 33 (15.3%) | 44 (20.4%) | 127 (58.8%) |

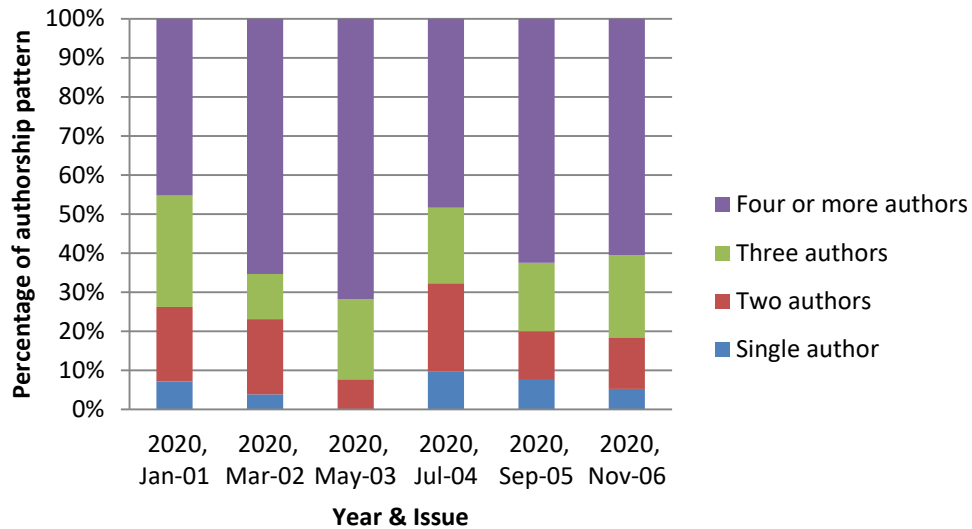


Figure 4: Authorship pattern by issue-wise (2020)

4.4 Collaborative index (CI), Degree of collaboration (DC), and Collaboration co-efficient (CC)

In table 7 and 8, the collaborative index, Degree of collaboration, and collaboration co-efficient were given for 2019 and 2020, respectively. In the table below, the average number of authors (CI) ranged from 3.5 to 5.5, which were similar in both years. DC and CC tend towards one, which implies the proportion of multi-authored papers was more when compared to single-authored papers. In both years, the trend is similar as DC and CC is above 0.5.

Table 7

Collaboration patterns of articles in 2019

| Year and Issue | CI | DC | CC |
|-----------------------|-----------|-----------|-----------|
| 2019, Jan-01 | 3.80 | 0.80 | 0.57 |
| 2019, Mar-02 | 4.83 | 1.00 | 0.76 |
| 2019, May-03 | 4.80 | 1.00 | 0.77 |
| 2019, July-04 | 4.58 | 1.00 | 0.73 |
| 2019, Sept-05 | 4.57 | 0.96 | 0.71 |
| 2019, Nov-06 | 4.58 | 1.00 | 0.73 |

(Note. CI- Collaborative index, DC- Degree of collaboration, and CC- Collaboration co-efficient)

Table 8

Collaboration parameters of articles in 2020

| Year and Issue | CI | DC | CC |
|-----------------------|-----------|-----------|-----------|
| 2020, Jan-01 | 3.50 | 0.93 | 0.64 |
| 2020, Mar-02 | 4.73 | 0.96 | 0.71 |
| 2020, May-03 | 5.26 | 1.00 | 0.77 |
| 2020, July-04 | 3.77 | 0.90 | 0.63 |
| 2020, Sept-05 | 4.28 | 0.93 | 0.68 |
| 2020, Nov-06 | 4.11 | 0.95 | 0.69 |

(Note. CI- Collaborative index, DC- Degree of collaboration, and CC- Collaboration co-efficient)

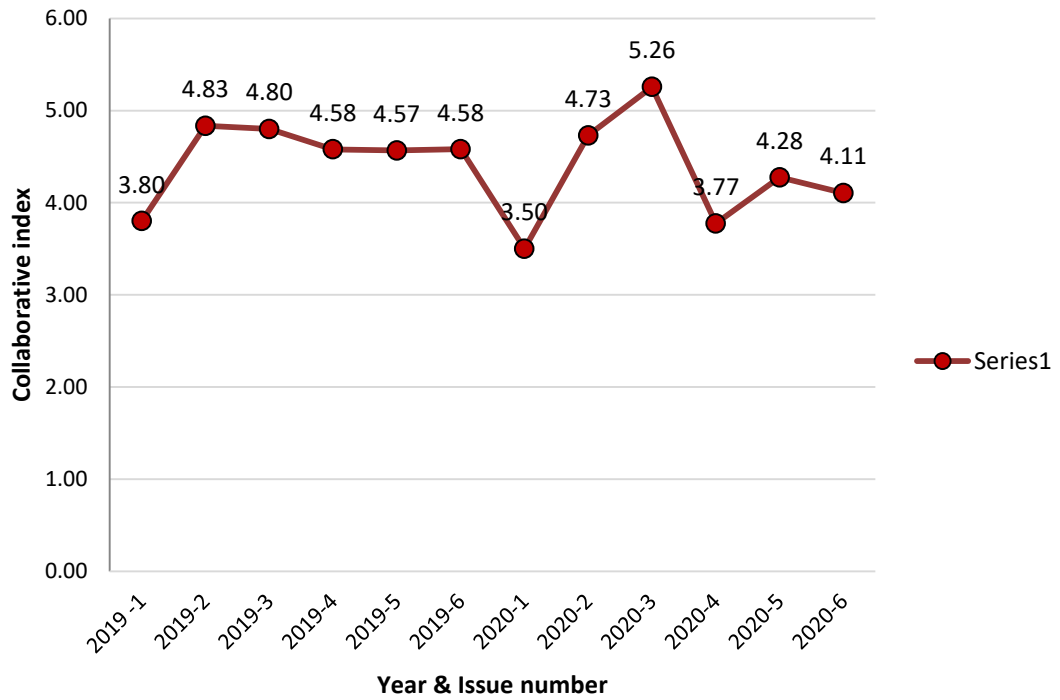


Figure 5: Collaborative Index in 2019 and 2020

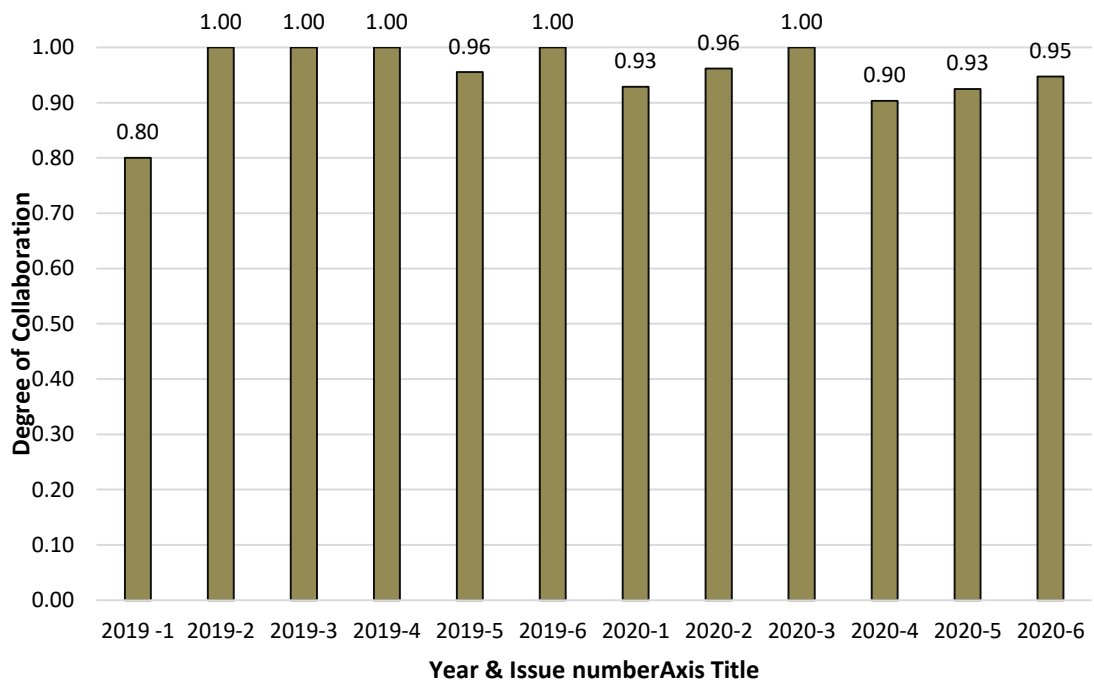


Figure 6: Degree of Collaboration in 2019 and 2020

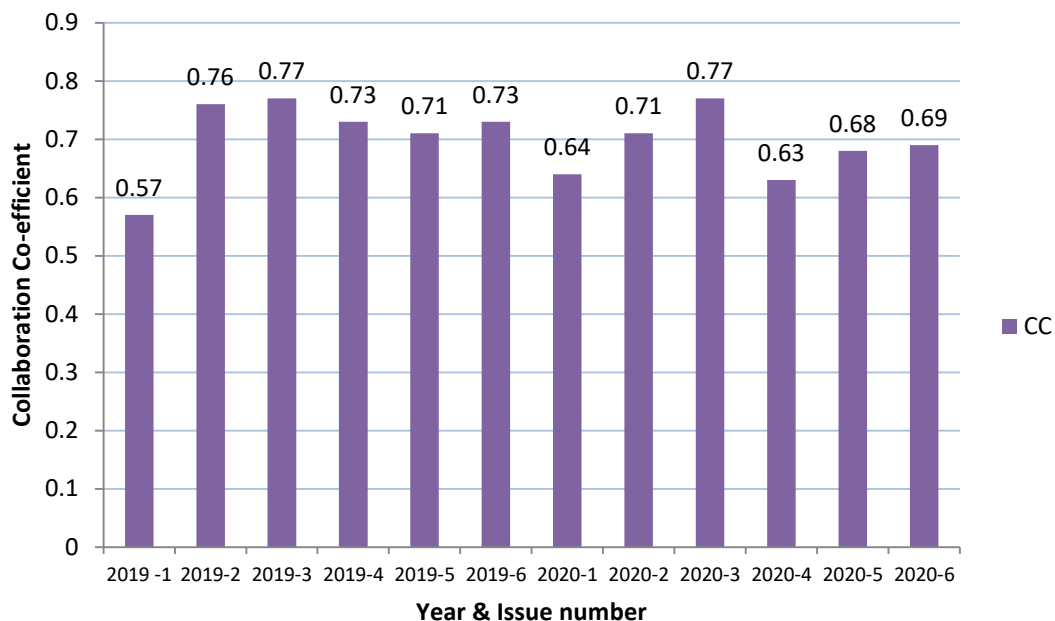


Figure 7: Collaboration Co-efficient in 2019 and 2020

4.5 Author-wise productivity

Among the authors, Robert T. Sataloff ranked first with four articles in 2019 and 2020 each. Tables 9 and 10 highlighted the top three most productive authors of 2019 and 2020 instead of the top five because the highest number of articles published were four.

Table 9

Top 3 ranks of authors in the year 2019

| Rank | Author | Articles published |
|------|----------------------|--------------------|
| I | Robert T. Sataloff | 4 |
| I | In-Ho Bae | 4 |
| I | Edie R. Hapner | 4 |
| I | Jack J. Jiang | 4 |
| I | Anne-Maria Laukkanen | 4 |

| | | |
|------------|-------------------------------|---|
| I | Yeon-Woo Lee | 4 |
| I | Vanessa Veis Ribeiro | 4 |
| I | Rahul Shrivastav | 4 |
| I | Kelly Cristina Alves Silverio | 4 |
| I | Soo-Geun Wang | 4 |
| II | Supraja Anand | 3 |
| II | Alcione Ghedini Brasolotto | 3 |
| II | Thomas L Carroll | 3 |
| II | David A. Eddins | 3 |
| II | Ana Cristina Cortes Gama | 3 |
| II | Jing Kang | 3 |
| II | Lisa M. Kopf | 3 |
| II | Dominique Morsomme | 3 |
| II | Mark D. Skowronski | 3 |
| II | Chao Xue | 3 |
| II | Yi Zhang | 3 |
| II | Peiyun Zhuang | 3 |
| III | Anna Alice Almeida | 2 |
| III | Mara Behlau, | 2 |
| III | Hakan Birkent | 2 |
| III | Prakash Boominathan | 2 |

Note. The detailed list of III ranks is given in Appendix I

Table 10

Top 3 ranks of authors in the year 2020

| Rank | Authors | Articles published |
|-------------|--------------------|---------------------------|
| I | Robert T. Sataloff | 4 |
| I | Camille Finck | 4 |
| I | Abdul-Latif Hamdan | 4 |
| I | Elie Khalifee | 4 |
| I | Mara Behlau | 4 |
| I | Sevtap Akbulut | 4 |

| | | |
|------------|------------------------|---|
| I | Esra Ozcebe | 4 |
| I | Fatma Esen Aydinli | 4 |
| II | Meike Brockmann-Bauser | 3 |
| II | Necati Enver | 3 |
| II | Clark A. Rosen | 3 |
| II | Anthony Ghanem | 3 |
| II | Sara D'Amario | 3 |
| II | Anne-Maria Laukkanen | 3 |
| II | Elina Kankare | 3 |
| II | Ahmed Geneid | 3 |
| II | Ronald C. Scherer | 3 |
| II | Negin Moradi | 3 |
| II | Majid Soltani | 3 |
| II | Carla Aparecida Cielo | 3 |
| II | Payman Dabirmoghadam | 3 |
| II | Kimberly L. Dahl | 3 |
| III | Ashwini Joshi | 2 |
| III | Christopher R. Watts | 2 |
| III | Mary J. Sandage | 2 |

Note. The detailed list of III ranks is given in Appendix II

4.6 Collaborative pattern

The collaborative pattern was also investigated in this study. The first step was to examine for collaboration in the articles, whether the article was published by a single author or a group of authors. If it was a single-authored paper, it implied there was no collaboration. However, if it was multi-authored, it implied there was collaboration. It can be observed that collaboration was present in 202 (96.2%) and 204 (94.4%) articles in 2019 and 2020, respectively. Table 11 and Table 12 depicts the presence of collaboration details in 2019 and 2020, respectively.

Table 11

Collaborative pattern in the year 2019

| Year and Issue | Yes | No |
|-----------------------|--------------------|-----------------|
| 2019, Jan-01 | 20 (80%) | 5 (20%) |
| 2019, Mar-02 | 24 (100%) | 0 (0%) |
| 2019, May-03 | 25 (100%) | 0 (0%) |
| 2019, July-04 | 38 (100%) | 0 (0%) |
| 2019, Sept-05 | 64 (95.5%) | 3 (4.5%) |
| 2019, Nov-06 | 31 (100%) | 0 (0%) |
| TOTAL | 202 (96.2%) | 8 (3.8%) |

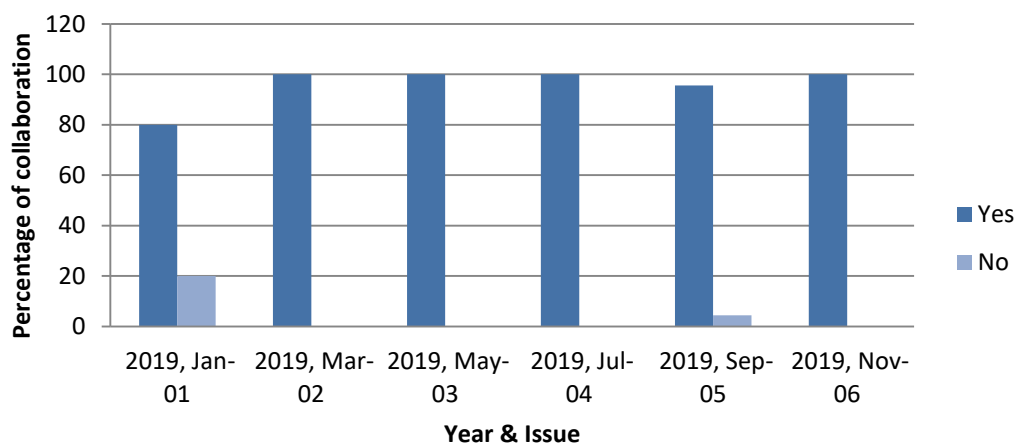
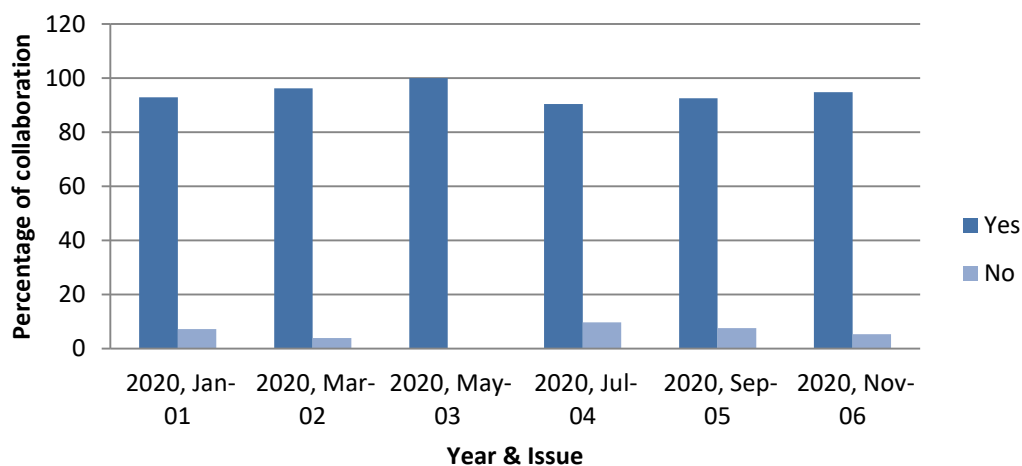
*Figure 8: Collaborative pattern by issue-wise (2019)*

Table 12

Collaborative pattern in the year 2020

| Year and Issue | Yes | No |
|-----------------------|--------------------|------------------|
| 2020, Jan-01 | 39 (92.9%) | 3 (7.1%) |
| 2020, Mar-02 | 25 (96.2%) | 1 (3.8%) |
| 2020, May-03 | 39 (100%) | 0 (0%) |
| 2020, July-04 | 28 (90.3%) | 3 (9.7%) |
| 2020, Sept-05 | 37 (92.5%) | 3 (7.5%) |
| 2020, Nov-06 | 36 (94.7%) | 2 (5.3%) |
| TOTAL | 204 (94.4%) | 12 (5.6%) |

*Figure 9: Collaborative pattern by issue-wise (2020)*

Articles containing collaboration were grouped into three categories: local collaboration, national collaboration, and international collaboration. It was observed that local collaboration ranked first with 96 (47.5%) and 110 (53.9%) articles,

national collaboration ranked second with 64 (31.7%) and 55 (27%) articles, and international collaboration ranked third with 42 (20.8%) and 39 (19.1%) in 2019, and 2020, respectively. Table 13 and 14 depicts the different types of collaboration.

Table 13

Type of collaboration in 2019

| Year and Issue | Local collaboration | National collaboration | International collaboration |
|----------------|---------------------|------------------------|-----------------------------|
| 2019, Jan-01 | 12 (60%) | 5 (25%) | 3 (15%) |
| 2019, Mar-02 | 14 (58.3%) | 8 (33.4%) | 2 (8.3%) |
| 2019, May-03 | 14 (56%) | 7 (28%) | 4 (16%) |
| 2019, July-04 | 15 (39.5%) | 9 (23.7%) | 14 (36.8%) |
| 2019, Sept-05 | 31 (48.4%) | 18 (28.2%) | 15 (23.4%) |
| 2019, Nov-06 | 10 (32.3%) | 17 (54.8%) | 4 (12.9%) |
| TOTAL | 96 (47.5%) | 64 (31.7%) | 42 (20.8%) |

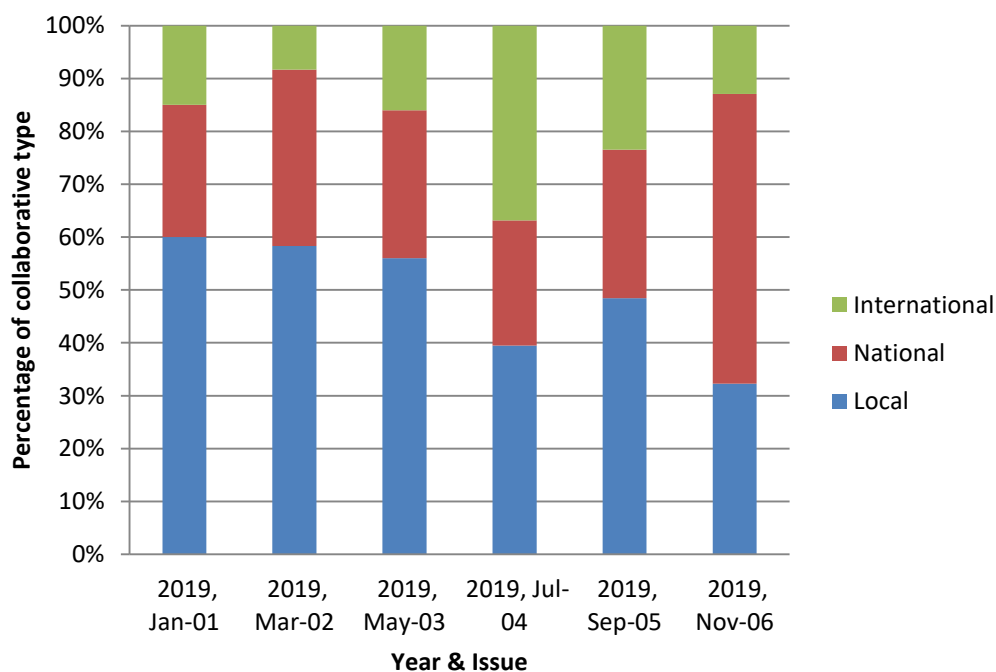
*Figure 10: Type of Collaboration by issue-wise (2019)*

Table 14

Type of collaboration in 2020

| Year and Issue | Local collaboration | National collaboration | International collaboration |
|-----------------------|--------------------------------|-----------------------------------|--|
| 2020, Jan-01 | 23 (59%) | 9 (23.1%) | 7 (17.9%) |
| 2020, Mar-02 | 13 (52%) | 7 (28%) | 5 (20%) |
| 2020, May-03 | 20 (51.3%) | 11 (28.2%) | 8 (20.5%) |
| 2020, July-04 | 13 (46.4%) | 9 (32.2%) | 6 (21.4%) |
| 2020, Sept-05 | 26 (70.3%) | 6 (16.2%) | 5 (13.5%) |
| 2020, Nov-06 | 15 (41.7%) | 13 (36.1%) | 8 (22.2%) |
| TOTAL | 110 (53.9%) | 55 (27%) | 39 (19.1%) |

*Figure 11: Type of Collaboration by issue-wise (2020)***4.7 Country-wise productivity**

The countries from which the authors published their articles were ranked. In Local and National collaboration, the USA ranked first in 2019 and 2020 with 50 and

69 articles, respectively. The top 5 countries of both years have been given below in table 15 and 16 during 2019 and 2020, respectively.

Table 15

Country-wise productivity in the year 2019

| Rank | Country | No of articles |
|-------------|----------------|-----------------------|
| I | USA | 50 |
| II | Brazil | 23 |
| III | Turkey | 16 |
| IV | India | 10 |
| IV | China | 10 |
| V | South Korea | 8 |

Table 16

Country-wise productivity in the year 2020

| Rank | Country | No of articles |
|-------------|----------------|-----------------------|
| I | USA | 69 |
| II | Turkey | 15 |
| III | Brazil | 12 |
| IV | Iran | 8 |
| IV | Germany | 8 |
| V | India | 7 |

The USA ranked first in the international collaboration category in 2019 and 2020 with 16 and 15 articles, respectively. Authors from the USA collaborated with 13 different countries in both 2019 and 2020. The highest number of countries

collaborated on one article is four countries. In 2019, the USA, France, India, and Jordan, and in 2020, Iran, Belgium, South Africa, and the UK collaborated.

The detailed collaboration of each country with other countries is given in Appendix III and IV.

4.8 Topic-wise distribution of articles

Among the 426 articles considered for the study, 203 (47.6%) articles were from SLP assessment which ranked first, 62 (14.6%) articles from Voice science which ranked second, SLP management, ranked third with 60 (14.1%) articles. The category with the least articles was combined treatment effects with 5 (1.2%) articles.

In 2019, SLP assessment ranked first with 97 (46.2%) articles, Voice science ranked second with 35 (16.7%) articles, and SLP management ranked third with 26 (12.4%) articles. The category with the least articles was combined treatment effects with 5 (2.4%) articles.

In 2020, 106 (49.1%) articles were from SLP assessment which ranked first, 34 (15.4%) articles from SLP management ranked second, and Voice science ranked third with 27 (12.5%) articles. The category with the least articles was combined treatment effects with 0 (0%) articles and the second least category was Voice medicine with 9(4%) articles. Tables 17 and 18 represent the topic-wise distribution of articles in 2019 and 2020, respectively.

Table17

Topic-wise distribution of articles in 2019

| Year and Issue | Voice sciences | Voice medicine | Voice surgery | Model or simulated studies | SLP assess - ment | SLP manage - ment | Combined treatment effects | Others |
|-------------------------------|---------------------------|---------------------------|--------------------------|---|----------------------------------|----------------------------------|---|---------------|
| 2019, Jan-01 | 1 (4%) | 1 (4%) | 4 (16%) | 1 (4%) | 12 (48%) | 3 (12%) | 0 (0%) | 3 (12%) |
| 2019, Mar-02 | 6 (25%) | 0 (0%) | 2 (8.3%) | 0 (0%) | 11 (45.8%) | 3 (12.5%) | 1 (4.2%) | 1 (4.2%) |
| 2019, May-03 | 5 (20%) | 2 (8%) | 1 (4%) | 0 (0%) | 11 (44%) | 4 (16%) | 1 (4%) | 1 (4%) |
| 2019, July-04 | 7 (18.4%) | 1 (2.6%) | 3 (7.9%) | 3 (7.9%) | 19 (50%) | 3 (7.9%) | 0 (0%) | 2 (5.3%) |
| 2019, Sept-05 | 10 (14.9%) | 2 (3%) | 8 (11.9%) | 4 (6%) | 29 (43.3%) | 9 (13.4%) | 3 (4.5%) | 2 (3%) |
| 2019, Nov-06 | 6 (19.4%) | 0 (0%) | 2 (6.4%) | 2 (6.4%) | 15 (48.4%) | 4 (13%) | 0 (0%) | 2 (6.4%) |
| TOTAL | 35 (16.7%) | 6 (2.9%) | 20 (9.5%) | 10 (4.8%) | 97 (46.2%) | 26 (12.4%) | 5 (2.4%) | 11 (5.1%) |

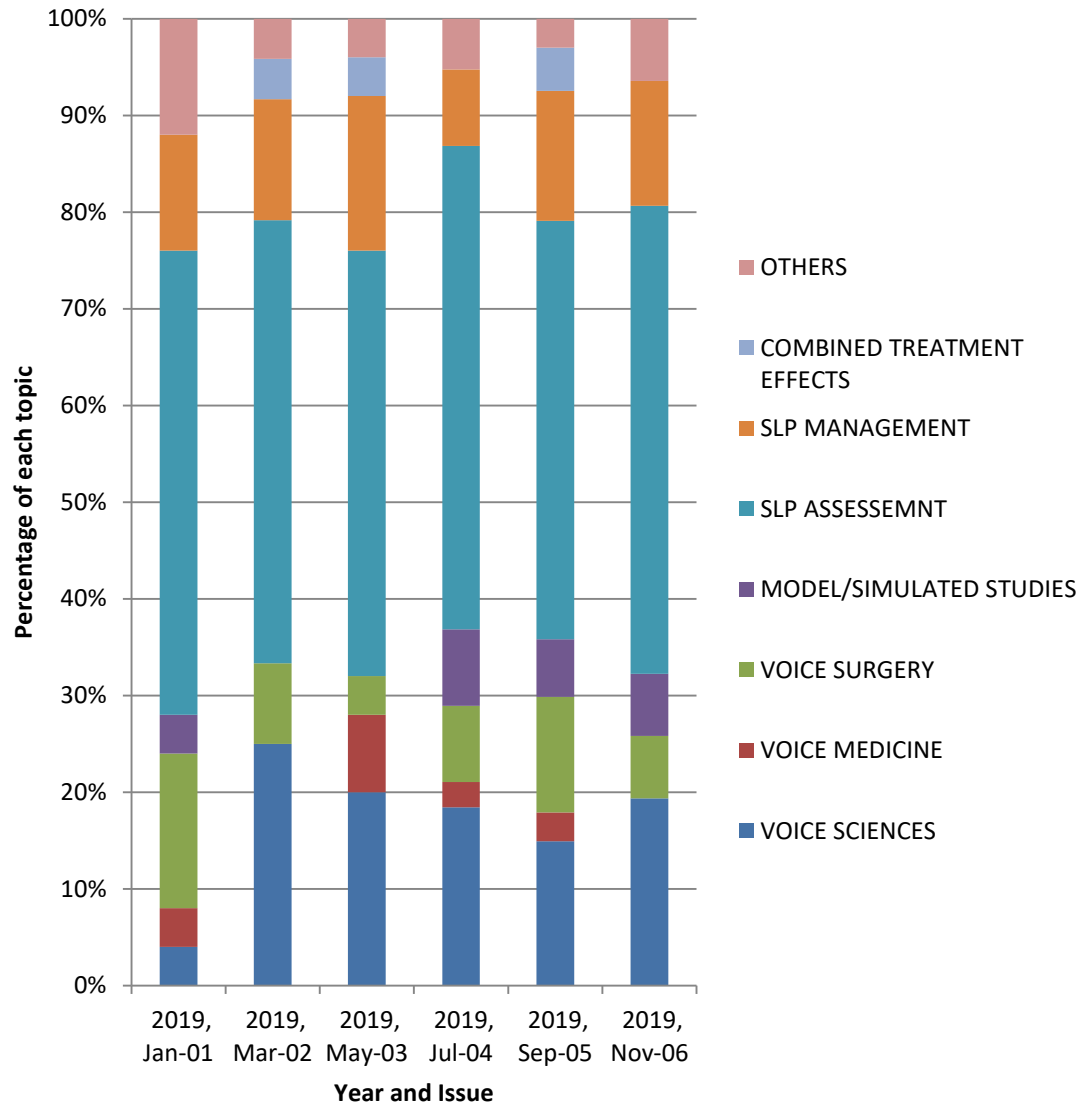


Figure 12: Distribution of articles based on the topic by issue-wise (2019)

Table 18

Topic-wise distribution of articles in 2020

| Year and Issue | Voice science | Voice medicine | Voice surgery | Model or simulate d studies | SLP assess- ment | SLP manage- ment | Combin ed treatme nt effects | Others |
|-------------------------------|--------------------------|---------------------------|--------------------------|--|---------------------------------|---------------------------------|---|---------------|
| 2020, Jan-01 | 5 (11.9%) | 3 (7.1%) | 6 (14.3%) | 2 (4.8%) | 16 (38.1%) | 4 (9.5%) | 0 (0%) | 6 (14.3%) |
| 2020, Mar-02 | 3 (11.5%) | 1 (3.9%) | 0 (0%) | 2 (7.7%) | 15 (57.7%) | 4 (15.4%) | 0 (0%) | 1 (3.8%) |
| 2020, May-03 | 8 (20.5%) | 1 (2.6%) | 0 (0%) | 2 (5.1%) | 21 (53.8%) | 7 (18%) | 0 (0%) | 0 (0%) |
| 2020, July-04 | 4 (12.9%) | 0 (0%) | 4 (12.9%) | 2 (6.4%) | 15 (48.4%) | 6 (19.4%) | 0 (0%) | 0 (0%) |
| 2020, Sept-05 | 5 (12.5%) | 3 (7.5%) | 4 (10%) | 0 (0%) | 21 (52.5%) | 6 (15%) | 0 (0%) | 1 (2.5%) |
| 2020, Nov-06 | 2 (5.3%) | 1 (2.6%) | 2 (5.3%) | 3 (7.9%) | 18 (47.4%) | 7 (18.4%) | 0 (0%) | 5 (13.1%) |
| TOTAL | 27 (12.5%) | 9 (4.2%) | 16 (7.4%) | 11 (5.1%) | 106 (49.1%) | 34 (15.4%) | 0 (0%) | 13 (6%) |

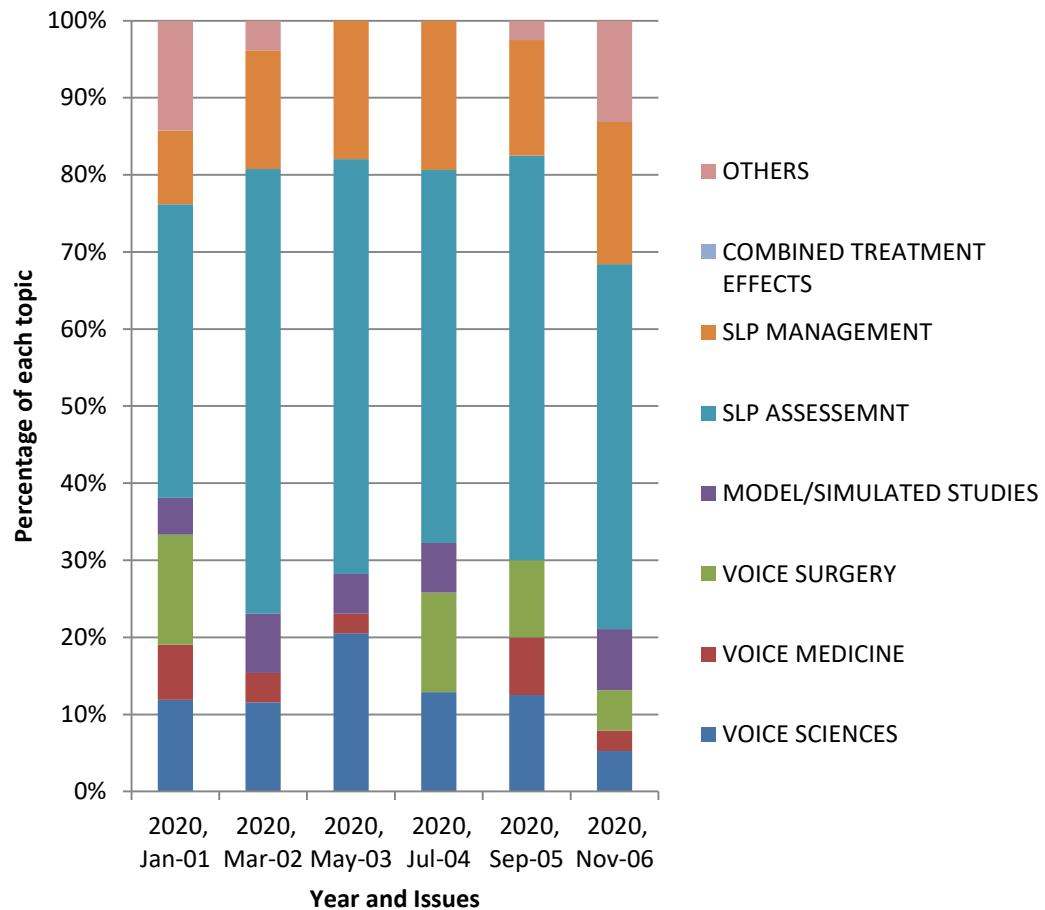


Figure 13: Distribution of articles based on topics by issue-wise (2020)

4.9 Type of participants

Out of 426 articles, 370 (86.9%) articles considered human participants, 7 (1.6%) articles included non-human participants, 1 (0.2%) article has both human and non-human participants, and 48 (11.3%) articles belong to the ‘not applicable’ category.

In 2019, articles containing human participants were ranked first with 179 (85.2%) articles, articles belonging to the ‘not applicable’ category ranked second with 24 (11.4%) articles, articles with non-human participants ranked third with 6 (2.9%) articles, and lastly, article with both human and non-human participants

ranked fourth with 1 (0.5%) article. Two articles also included cadaveric participants, of which one belonged to only human participants, and the other had both human and non-human participants.

In 2020, articles containing human participants were ranked first with 191 (88.4%) articles, articles belonging to the not applicable category ranked second with 24 (11.1%) articles, and articles with non-human participants ranked third with just 1 (0.5%) article. Tables 19 and 20 depict the type of participants in 2019 and 2020, respectively.

Table 19

Type of participants in the year 2019

| Year and Issue | Human | Non-Human | Both | Not applicable |
|-----------------------|--------------------|------------------|-----------------|-----------------------|
| 2019, Jan-01 | 16 (64%) | 2 (8%) | 0 (0%) | 7 (28%) |
| 2019, Mar-02 | 23 (95.8%) | 0 (0%) | 0 (0%) | 1 (4.2%) |
| 2019, May-03 | 22 (88%) | 0 (0%) | 0 (0%) | 3 (12%) |
| 2019, July-04 | 35 (92.1%) | 0 (0%) | 0 (0%) | 3 (7.9%) |
| 2019, Sept-05 | 55 (82.1%) | 3 (4.5%) | 1 (1.5%) | 8 (11.9%) |
| 2019, Nov-06 | 28 (90.3%) | 1 (3.2%) | 0 (0%) | 2 (6.5%) |
| TOTAL | 179 (85.2%) | 6 (2.9%) | 1 (0.5%) | 24 (11.4%) |

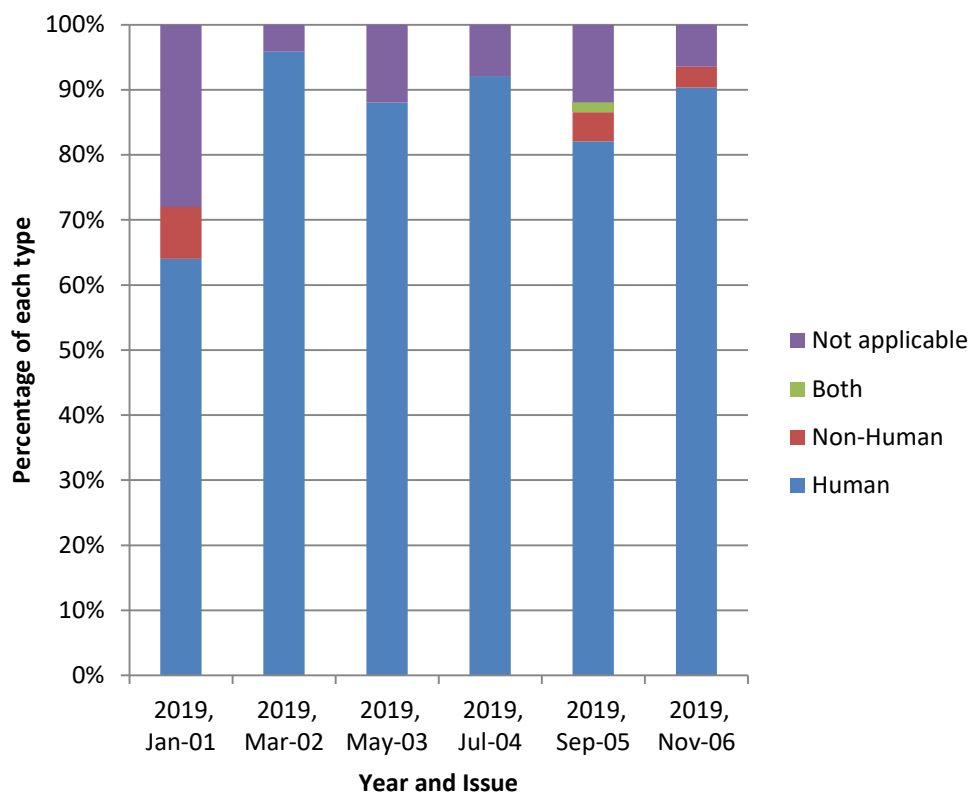


Figure 14: Type of participants by issue-wise (2019)

Table 20

Type of participants in the year 2020

| Year and Issue | Human | Non-Human | Both | Not applicable |
|----------------|--------------------|-----------------|---------------|-------------------|
| 2020, Jan-01 | 36 (85.7%) | 1 (2.4%) | 0 (0%) | 5 (11.9%) |
| 2020, Mar-02 | 22 (84.6%) | 0 (0%) | 0 (0%) | 4 (15.4%) |
| 2020, May-03 | 39 (100%) | 0 (0%) | 0 (0%) | 0 (0%) |
| 2020, July-04 | 26 (83.9%) | 0 (0%) | 0 (0%) | 5 (16.1%) |
| 2020, Sept-05 | 37 (92.5%) | 0 (0%) | 0 (0%) | 3 (7.5%) |
| 2020, Nov-06 | 31 (81.6%) | 0 (0%) | 0 (0%) | 7 (18.4%) |
| TOTAL | 191 (88.4%) | 1 (0.5%) | 0 (0%) | 24 (11.1%) |

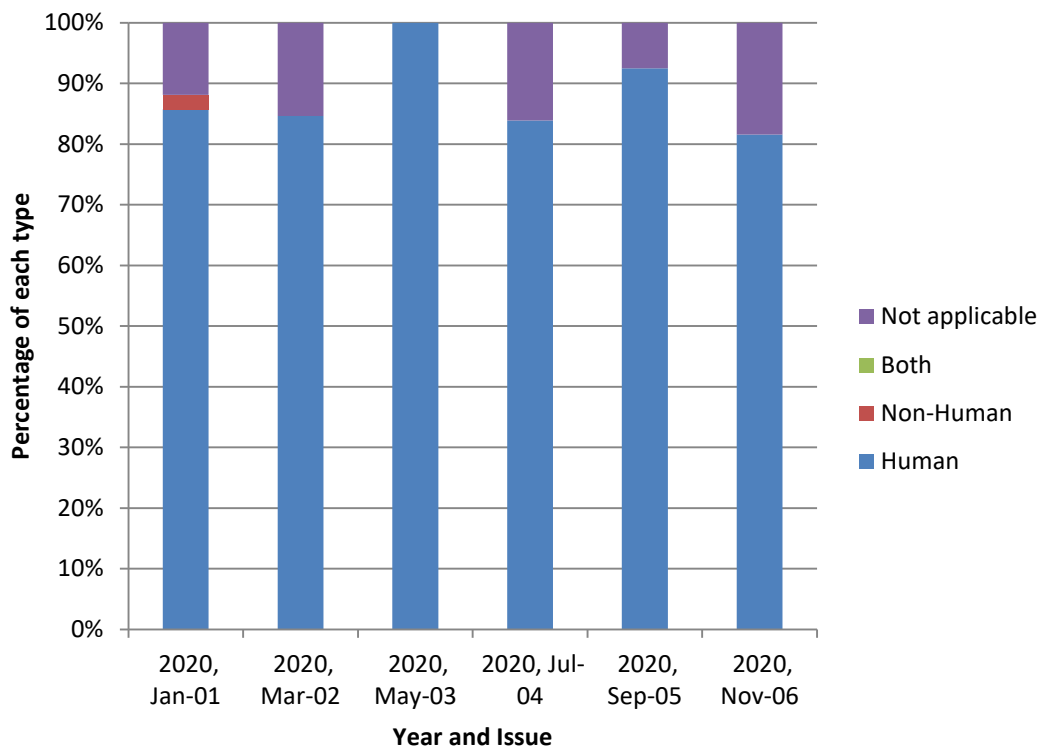


Figure 15: Type of participants by issue-wise (2020)

4.10 Age group of participants

For the results of this section, the data were grouped based on not specified (the age of the participants were not specified), pediatric only (P), adults-only (A), geriatric only (G), pediatric, and adults (P & A), adults and geriatric (A & G), and pediatric, adult and geriatric (P, A & G). Out of the total 426 articles, 370 (86.9%) articles had human participants. From these 370 articles, 30 (8.1%) articles did not mention the age of the participants, 9 (2.4%) articles had pediatric only, 131 (35.4%) articles had adults only, 17 (4.6%) articles had geriatric only, 17 (4.6%) articles had both pediatric and adults; 161 (43.5%) articles had both adults and geriatric; and 5 (1.3%) articles had all pediatric, adult and geriatric participants.

In the year 2019, the articles with adult-only participants ranked first with 74 (41.3%) articles, the second rank was articles containing both adult and geriatrics with

62 (34.6%) articles and articles containing all the three age group combined was last with just 2 (1.1%) articles.

In the year 2020, the articles with both adult and geriatric participants ranked first with 99 (51.8%) articles, the second rank was articles containing adult-only participants with 57 (29.9%) articles, and articles containing pediatric only participants were ranked last with just 1 (0.5%) article.

Table 21

Age group of participants in the year 2019

| Year and Issue | Not specified | P | A | G | P & A | A & G | P, A & G |
|-----------------------|----------------------|--------------|---------------|--------------|------------------|------------------|---------------------|
| 2019, Jan-01 | 4 (25%) | 0 (0%) | 8 (50%) | 1 (6.25%) | 0 (0%) | 3 (18.75%) | 0 (0%) |
| 2019, Mar-02 | 2 (8.7%) | 0 (0%) | 12 (5.2%) | 2 (8.7%) | 1 (4.3%) | 6 (26.1%) | 0 (0%) |
| 2019, May-03 | 4 (18.2%) | 2 (9.1%) | 5 (22.7%) | 0 (0%) | 1 (4.5%) | 10 (45.5%) | 0 (0%) |
| 2019, July-04 | 3 (8.6%) | 1 (2.8%) | 15 (42.9%) | 2 (5.7%) | 3 (8.6%) | 10 (28.6%) | 1 (2.8%) |
| 2019, Sept-05 | 1 (1.8%) | 2 (3.6%) | 22 (40%) | 3 (5.5%) | 3 (5.5%) | 24 (43.6%) | 0 (0%) |
| 2019, Nov-06 | 2 (7.1%) | 3 (10.7%) | 12 (42.9%) | 0 (0%) | 1 (3.6%) | 9 (32.1%) | 1 (3.6%) |
| TOTAL | 16 (9%) | 8 (4.5%) | 74 (41.3%) | 8 (4.5%) | 9 (5%) | 62 (34.6%) | 2 (1.1%) |

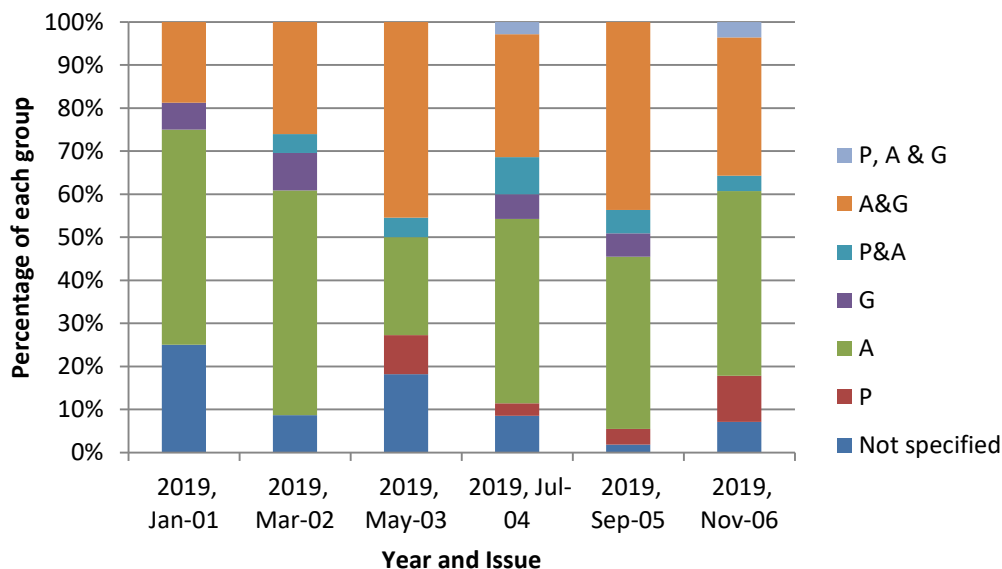


Figure 16: Age group of participants by issue-wise (2019)

Table 22

Age group of participants in the year 2020

| Year and Issue | Not specified | P | A | G | P & A | A & G | P, A & G |
|----------------|---------------|-------------|---------------|-------------|--------------|---------------|-------------|
| 2020, Jan-01 | 3 (8.3%) | 0 (0%) | 10 (27.8%) | 2 (5.5%) | 1 (2.8%) | 19 (52.8%) | 1 (2.8%) |
| 2020, Mar-02 | 1 (4.5%) | 1 (4.5%) | 4 (18.2%) | 1 (4.5%) | 2 (9.2%) | 13 (59.1%) | 0 (0%) |
| 2020, May-03 | 2 (5.1%) | 0 (0%) | 14 (35.9%) | 3 (7.7%) | 1 (2.6%) | 19 (48.7%) | 0 (0%) |
| 2020, July-04 | 3 (11.5%) | 0 (0%) | 8 (30.8%) | 0 (0%) | 3 (11.5%) | 11 (42.3%) | 1 (3.8%) |
| 2020, Sept-05 | 4 (10.8%) | 0 (0%) | 12 (32.4%) | 1 (2.7%) | 1 (2.7%) | 19 (51.3%) | 0 (0%) |
| 2020, Nov-06 | 1 (3.2%) | 0 (0%) | 9 (29%) | 2 (6.4%) | 0 (0%) | 18 (58.1%) | 1 (3.2%) |
| TOTAL | 14 | 1 | 57 | 9 | 8 | 99 | 3 |
| | 191 (7.3%) | (0.5%) | (29.9%) | (4.7%) | (4.2%) | (51.8%) | (1.6%) |

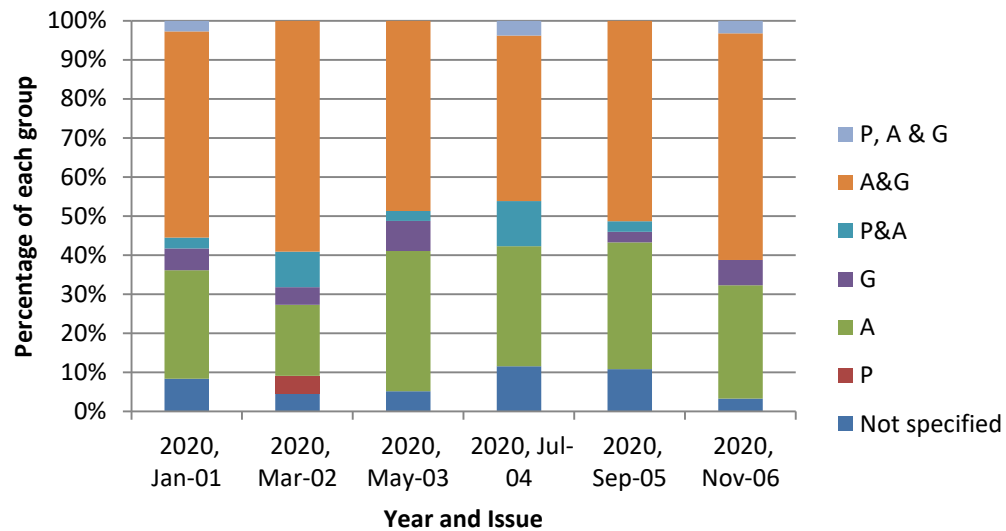


Figure 17: Age group of participants by issue-wise (2020)

4.11 Number of citations of the article

As of 27-06-21, the maximum number of citations received for an article in 2019 was ninety-five (95), and for the year 2020, it was twenty-five (25). The minimum number of citations for articles in the year 2019 and 2020 were zero. Below tables 23 and 24 depicts the top 5 most cited articles of 2019 and 2020, respectively.

Table 23

Top five cited articles of 2019

| Rank | Article | No of citations |
|------|--|-----------------|
| I | Fang, S. H., Tsao, Y., Hsiao, M. J., Chen, J. Y., Lai, Y. H., Lin, F. C., & Wang, C. T. (2019). Detection of Pathological Voice Using Cepstrum Vectors: A Deep Learning Approach. <i>Journal of Voice</i> , 33(5), 634–641. https://doi.org/10.1016/j.jvoice.2018.02.003 | 95 |

| | | |
|------------|---|----|
| II | Alves, M., Krüger, E., Pillay, B., Van Lierde, K., & Van der Linde, J. (2019). The Effect of Hydration on Voice Quality in Adults: A Systematic Review. <i>Journal of Voice</i> , 33(1), 125.e13-125.e28. https://doi.org/10.1016/j.jvoice.2017.10.001 | 49 |
| III | Hegde, S., Shetty, S., Rai, S., & Dodderi, T. (2019). A Survey on Machine Learning Approaches for Automatic Detection of Voice Disorders. <i>Journal of Voice</i> , 33(6), 947.e11-947.e33. https://doi.org/10.1016/j.jvoice.2018.07.014 | 37 |
| IV | Angadi, V., Croake, D., & Stemple, J. (2019). Effects of Vocal Function Exercises: A Systematic Review. <i>Journal of Voice</i> , 33(1), 124.e13-124.e34. https://doi.org/10.1016/j.jvoice.2017.08.031 | 32 |
| V | Cardoso, R., Lumini-Oliveira, J., & Meneses, R. F. (2019). Associations between Posture, Voice, and Dysphonia: A Systematic Review. <i>Journal of Voice</i> , 33(1), 124.e1-124.e12. https://doi.org/10.1016/j.jvoice.2017.08.030 | 31 |

Table 24

Top five cited articles of 2020

| Rank | Article | No of citations |
|-------------|---|------------------------|
| I | Phadke, K. V., Laukkanen, A. M., Ilomäki, I., Kankare, E., Geneid, A., & Švec, J. G. (2020). Cepstral and Perceptual Investigations in Female Teachers With Functionally Healthy Voice. <i>Journal of Voice</i> , 34(3), 485.e33-485.e43. https://doi.org/10.1016/j.jvoice.2018.09.010 | 25 |

| | | |
|------------|--|----|
| II | Herbst, C. T. (2020). Electrolottography – An Update. <i>Journal of Voice</i> , 34(4), 503–526. https://doi.org/10.1016/j.jvoice.2018.12.014 | 23 |
| III | Pommée, T., Maryn, Y., Finck, C., & Morsomme, D. (2020). Validation of the Acoustic Voice Quality Index, Version 03.01, in French. <i>Journal of Voice</i> , 34(4), 646.e11-646.e26. https://doi.org/10.1016/j.jvoice.2018.12.008 | 21 |
| IV | Vertanen-Greis, H., Löyttyniemi, E., & Uitti, J. (2020). Voice Disorders are Associated With Stress Among Teachers: A Cross-Sectional Study in Finland. <i>Journal of Voice</i> , 34(3), 488.e1-488.e8. https://doi.org/10.1016/j.jvoice.2018.08.021 | 19 |
| IV | Mansuri, B., Torabinezhad, F., Jamshidi, A. A., Dabirmoghadam, P., Vasaghi-Gharamaleki, B., & Ghelichi, L. (2020). Application of High-Frequency Transcutaneous Electrical Nerve Stimulation in Muscle Tension Dysphonia Patients With the Pain Complaint: The Immediate Effect. <i>Journal of Voice</i> , 34(5), 657–666. https://doi.org/10.1016/j.jvoice.2019.02.009 | 19 |
| IV | Barsties V. Latoszek, B., Lehnert, B., & Janotte, B. (2020). Validation of the Acoustic Voice Quality Index Version 03.01 and Acoustic Breathiness Index in German. <i>Journal of Voice</i> , 34(1), 157.e17-157.e25. https://doi.org/10.1016/j.jvoice.2018.07.026 | 19 |
| V | Doruk, C., Enver, N., Çaytemel, B., Azezli, E., & Başaran, B. (2020). Readability, Understandability, and Quality of Online Education Materials for Vocal Fold Nodules. <i>Journal of Voice</i> , 34(2), 302.e15-302.e20. https://doi.org/10.1016/j.jvoice.2018.08.015 | 18 |

4.12 Funding source

Out of the total 426 articles, 146 (34.3%) articles had funding. Out of the 146 articles, 73 (34.8%) articles were from 2019, and 73 (33.8%) articles were from 2020. In the below tables 25 and 26, the number of articles having funding and not having funding was mentioned for both 2019 and 2020, respectively.

Table 25

Number of articles funded in 2019

| Year and Issue | Yes | No |
|----------------|-------------------|--------------------|
| 2019, Jan-01 | 4 (16%) | 21 (84%) |
| 2019, Mar-02 | 6 (25%) | 18 (75%) |
| 2019, May-03 | 12 (48%) | 13 (52%) |
| 2019, July-04 | 15 (39.5%) | 23 (60.5%) |
| 2019, Sept-05 | 25 (37.3%) | 42 (62.7%) |
| 2019, Nov-06 | 11 (35.5%) | 20 (64.5%) |
| TOTAL | 73 (34.8%) | 137 (65.2%) |

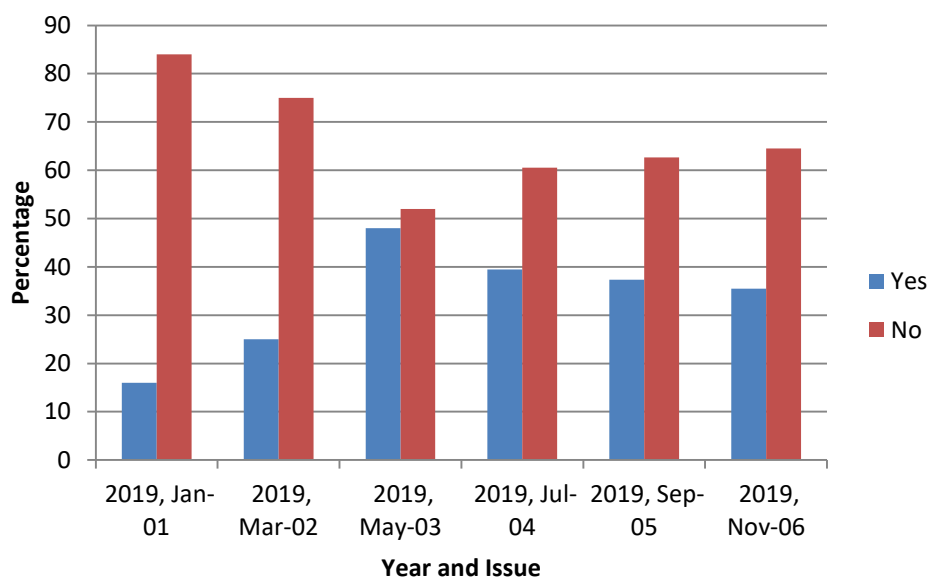
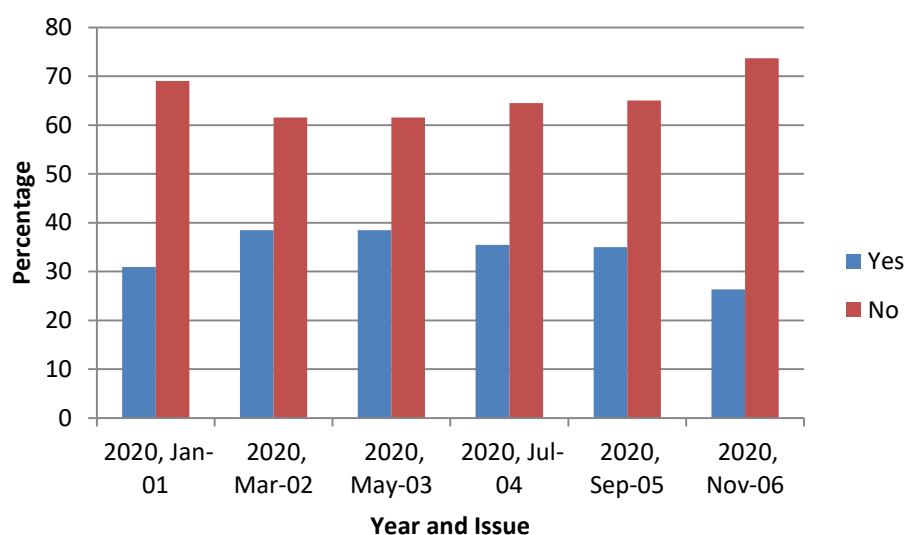


Figure 18: No of articles funded by issue-wise (2019)

Table 26

Number of articles funded in 2020

| Year and Issue | Yes | No |
|----------------|-------------------|--------------------|
| 2020, Jan-01 | 13 (30.9%) | 29 (69.1%) |
| 2020, Mar-02 | 10 (38.5%) | 16 (61.5%) |
| 2020, May-03 | 15 (38.5%) | 24 (61.5%) |
| 2020, July-04 | 11 (35.5%) | 20 (64.5%) |
| 2020, Sept-05 | 14 (35%) | 26 (65%) |
| 2020, Nov-06 | 10 (26.3%) | 28 (73.7%) |
| TOTAL | 73 (33.8%) | 143 (66.2%) |

*Figure 19: No of articles funded by issue-wise (2020)*

Out of the funding agencies, the funding agency ‘National Institutes of Health – National Institute on Deafness and Other Communication Disorders’ ranked first in 2019 and 2020 with 10 and 7 articles, respectively. Here, the top three funding agencies of 2019 and 2020 were considered instead of the top five because only these three satisfied the ranking criteria. Tables 27 and 28 depict the top 3 ranks of funding

agencies in 2019 and 2020, respectively. A detailed list of the funding agencies is given in Appendix V and VI.

Table 27

Top 3 ranks of funding agencies in the year 2019

| Rank | Funding agencies | Articles funded |
|-------------|--|------------------------|
| I | National Institutes of Health – National Institute on Deafness and Other Communication Disorders | 10 |
| II | National Natural Science Foundation of China | 7 |
| III | Fundacao de Amparo a Pesquisa do Estado de Sao Paulo— FAPESP | 5 |

Table 28

Top 3 ranks of funding agencies in the year 2020

| Rank | Funding agencies | Articles funded |
|-------------|--|------------------------|
| I | National Institutes of Health – National Institute on Deafness and Other Communication Disorders | 7 |
| II | National Institutes of Health | 3 |
| II | National Center for Advancing Translational Sciences | 3 |
| II | Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ) | 3 |
| II | Czech Science Foundation | 3 |
| II | Goldschmidt-Jacobson Foundation and the Gottfried Bangerter–Rhyner Foundation | 3 |

| | | |
|------------|--|---|
| III | Fondo Nacional de Desarrollo Científico y Tecnológico – FONDECYT | 2 |
| III | Coordenação de Aperfeiçoamento de Pessoal de Nível Superior- Brazil (CAPES) | 2 |
| III | Social Sciences and Humanities Research Council of Canada (SSHRC) | 2 |
| III | Diane M. Bless Endowed Chair | 2 |
| III | Iran University of Medical Sciences | 2 |
| III | Region Vastra Gotaland | 2 |

CHAPTER V

DISCUSSION

The aim of the present study is to determine the scientometric parameters of articles published in the Journal of Voice for a period of two years, 2019 and 2020. Journal of Voice is a peer-reviewed journal and is the world's premier journal for voice medicine and research (*Aims and Scope: Journal of Voice*, n.d.). It was found to the best of the author's knowledge and understanding that this study is one of the first to investigate the Bibliometric indices of the Journal of Voice.

The results of the study showed that the total number of publications/articles increased from the year 2019 to 2020. The journal had the highest research output in scientific articles (document-wise) ranked first in both years. In the field of Audiology and Phonology, among the published documents, Scientific articles were the highest type of documents published (Batcha & Chaturbhuji, 2019; Nandeesh & Begum, 2017) which was similar to the results reported in this study. It was also observed that the output of review articles increased from 5.7% in 2019 to 6% in 2020.

Analysis of authorship pattern revealed that multi-authored papers were more when compared to single-authored papers in 2019 and 2020 of Journal of Voice. Multi-authored papers might be more due to the less availability of the materials required for research, the distribution of work when doing the research, and the collaboration of experts from different fields, increasing the quality of the research output. In multi-authored papers, four or more authors contributing to a single research paper were more in 2019 and 2020. This contradicts the result, where the previous articles have found that, in the field of Audiology and research pertaining to

Asperger's syndrome, the highest collaboration was either two-authored or three-authored papers (Lorenzo et al., 2016; Nandeeshha & Begum, 2017).

Scientometric indicators like Collaborative Index (CI), Degree of Collaboration (DC), and Collaboration Co-efficient (CC) were used to analyze the authorship data. The results revealed that the mean authors per paper (CI) ranged from 3.5 to 5.5. Because CI has no upper limit, it is difficult to interpret. As a result, Degree of Collaboration was selected. It is a proportional metric; if the value approaches one, it suggests more multi-authored papers. In 2019, four issues had a DC value of 1. However, in 2020, only one issue had a DC value of 1. As CC tends to one, the probability of multi-authored papers was high. The CC ranged from 0.57 to 0.77. In 2019, five issues had a CC value greater than 0.7. However, in 2020, only two issues had a CC value greater than 0.7. These results also indicate that multi-authored papers dominated in Journal of Voice from 2019 to 2020. These results contradict the results obtained from Batcha & Chaturbuj (2019), where they reported that single-authored papers were more in the field of Phonology. This is most likely due to a disparity in the fields in which they conducted their research or the methodologies they employed. i.e., they conducted the study for 17 years from 2000-2017.

Analysis of author-wise productivity revealed that seventeen (17) authors had the highest productivity with four articles each, including 2019 and 2020. Robert T. Sataloff had the most research output with eight articles when both the years were combined.

The collaborative pattern indicated that 406 (95%) of the articles had collaboration, and collaboration was present in both 2019 and 2020. Only 20 (5%) of

the articles that were published had single-authored paper. Multi-authored papers may be more common due to the dispersion of work during the research process and the involvement of experts from other domains, all of which contribute to the higher quality of the research output. It was also observed that authors prefer local and national collaboration over international collaboration. It might be due to the difference in income, language, culture, and politics (Gazni, A., Sugimoto, C. R., & Didegah, 2012). In order to establish an international collaboration, the host institute must obtain permission from their respective university/government and reach an agreement on several matters before beginning the research. It could be a time-consuming and tedious operation. As a result, a researcher in the voice domain may not prefer international collaboration.

Country-wise productivity also follows a similar trend as observed in different fields like Big Data, Phonology, and Audiology as reported by previous studies (Singh et al., 2015; Batcha & Chaturbuj, 2019; Nandeesh & Begum, 2017) where the United States of America ranked first with the highest productivity. Probably because the United States is a developed country with state-of-the-art scientific facilities.

Based on the analysis of topic-wise distribution, articles in the SLP assessment domain are the highest, followed by the voice science domain. It was also observed that voice medicine and combined treatment effects had less than ten articles. One can note that, even though the collaborative index is good, the articles published on different topics were not uniform. It might be due to less multidisciplinary interaction. i.e., people from different domains collaborate less.

The results of the present study found that the published articles considered human participants are considered most for the research. Furthermore, the research was focused on both adults and geriatrics or adult-only participants out of the human participants. Research with pediatric participants is comparatively less. It may be due to children being considered a vulnerable subject population where conducting research with them has its challenges (Bloomfield, 2015), or the voice in children is not stable and is still developing in nature.

The number of citations for 426 articles was checked using Google scholar, a web search engine (Google Inc., 2017), because it includes many articles that have yet to be cataloged by the Web of Science or Scopus database, such as "in the press" papers that have been published online but have not yet been assigned an issue number (Faizan Ali, 2021). The highest cited articles titled *Detection of Pathological Voice Using Cepstrum Vectors: A Deep Learning Approach* (Fang et al., 2019) from 2019 and *Cepstral and Perceptual Investigations in Female Teachers With Functionally Healthy Voice* (Phadke et al., 2020) from 2020 belong to the topic SLP assessment. It could be because publications are more visible to researchers. The articles are available both online and offline, in other words. It is possible that the article would have been more relevant to the current topics being investigated worldwide, and it would have been easier to read.

This study also indicated that approximately 40% of the articles were given financial aid by different funding agencies. Many funding agencies contributed to the rise in publications/articles. The maximum number of articles (17 articles) was financed by the National Institutes of Health's National Institute on Deafness and Other Communication Disorders (NIH NIDCD), incorporating 2019 and 2020 outcomes.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The present study aimed at determining the trend of research in the field of voice. The author selected the Journal of Voice as it is the world's premier Journal in voice science & medicine and voice research. The author aimed at assessing the research trend of the articles in the Journal using scientometric tools during 2019 and 2020 (2 years). The objective of the study was to study the number of authors, authorship pattern, author-wise productivity, collaborative pattern, country-wise productivity, identify the funding agencies, and year-wise distribution of articles/publications in Journal of Voice during two years (2019 and 2020).

The information was collected from the Journal of Voice. Each article's detail was collected from the Journal within the timeline from January 2019 to December 2020. The online version (soft copy) of the Journal's published articles was considered for this study. The E-Journal facility provided by the Library and Information Centre of All India Institute of Speech and Hearing (AIISH), Mysore, was used. Articles in the Journal of Voice are published as issues for every two months throughout the year, for a total of six issues each year. A total of twelve issues (2019 and 2020) were examined in this study.

Information was gathered by going over each article one by one, and details pertaining to articles were organized, tabulated, and categorized issue-wise. For the complete segregation and tabulation of data, a Microsoft Excel sheet was utilized. The data collected was analyzed based on the total number of articles, document-type distribution, authorship pattern, author-wise productivity, collaboration pattern, country-wise productivity, topic-wise distribution, type of participants, age group of participants, the number of citations, and the funding agencies. Scientometric tools

like Collaboration Index Degree of Collaboration and Collaboration Co-efficient were analyzed from the data.

The results of the present study revealed several points of interest;

- I. The total research articles published in two years was four hundred and twenty-six articles.
- II. Scientific articles (92.9%) were the highest type of document-type published, and it was followed by review articles (5.7%).
- III. It was also observed that multi-authored papers (95.3%) were high when compared to single-authored papers (4.7%). In multi-authored papers, four or more authored papers (61%) were in maximum number.
- IV. In both years, Collaboration Index showed a similar pattern, with an average number of authors ranging from 3.5 to 5.5. The Degree of Collaboration ranged from 0.8 to 1.0, and Collaboration Co-efficient ranged from 0.57 to 0.77, implying that the proportion of multi-authored publications was higher than that of single-authored papers.
- V. Among the authors, Robert T. Sataloff ranked first with four published articles each, in 2019 and 2020.
- VI. Local collaboration ranked first, national collaboration ranked second, and international collaboration ranked third in 2019 and 2020.
- VII. The USA ranked first in 2019 and 2020 with 50 and 69 articles, respectively.

- VIII. In 2019 and 2020, the USA ranked top in the international collaboration category, with 16 and 15 publications, respectively.
- IX. The highest number of articles were published under the SLP assessment (48%), followed by the Voice science category in topic-wise distribution (15%).
- X. In the type of participants, the maximum type of participants were human participants, with 370 (86.9%) of the 426 articles. Among the human participants, articles having adult-only, and both adults and geriatric participants were maximum in number.
- XI. As of 27-06-21, the highest number of citations received for an article in 2019 was ninety-five (95), while the maximum number for 2020 was twenty-five (25).
- XII. The National Institutes of Health's National Institute on Deafness and Other Communication Disorders ranked first among the funding agencies by funding a maximum of 10 and 7 articles in 2019 and 2020, respectively.

In summary, this study observed and reported the research trend in the field of voice by using the world's premier Journal, i.e., Journal of Voice. Articles from the Journal were subjected to a comprehensive bibliometric analysis. This study gives an overview of the research trend and content published in the select Journal, Journal of Voice.

Implications of the study

- a) This research can assist researchers in determining the area of a research gap for future studies.

- b) This research can be a guide to the researcher to choose an appropriate funding agency, based on the type of research.

Limitations

- a) As two consecutive years were taken in the present study, there was not much difference observed in the published content. So, the trends in both years were almost similar. As a result, other scientometric parameters like Doubling Time (DT), Relative Growth Rate, and Growth Rate could not be carried out.
- b) As only one Journal was considered for this study, the trend observed in voice research cannot be generalized.

Future directions

- a) A similar study can be carried out for a different journal, or for a specific topic like stuttering or Augmentative and Alternative Communication (AAC).
- b) Further studies can be done to determine such research trends by considering more number of years or periods like from 2011 to 2021 or choosing two different years like 1995 and 2005.

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APPENDIX I

Detailed list of authors with III rank (2019)

| Authors | No of articles |
|-----------------------------|-----------------------|
| Paul Carding | 2 |
| Payman Dabirmoghaddam | 2 |
| Amanda Gabriela de Oliveira | 2 |
| Usha Devadas | 2 |
| Maria Dietrich | 2 |
| Maryam Faham | 2 |
| Jackie L. Gartner-Schmidt | 2 |
| Ahmed Geneid | 2 |
| Anthony Ghanem | 2 |
| Ting Gong | 2 |
| Marco Guzman, | 2 |
| Abdul-Latif Hamdan | 2 |
| Bernard Harmegnies | 2 |
| Manisha Hegde | 2 |
| Kathy Huet | 2 |
| Michael M. Johns III | 2 |
| Hussein Jaffal | 2 |
| Jack Jiang | 2 |
| Elie Khalifee | 2 |
| Geun-Hyo Kim | 2 |
| HyangHee Kim | 2 |
| Seong-Tae Kim | 2 |
| Stefan Kniesburges | 2 |
| Jiangping Kong | 2 |
| Melda Kunduk | 2 |
| Soon-Bok Kwon | 2 |
| Jiazhen Le | 2 |
| Jérôme R. Lechien | 2 |
| Jin-Choon Lee | 2 |
| Kristiane van Lierde | 2 |
| Jeannie van der Linde | 2 |
| Elke Loos | 2 |
| Dan Lu | 2 |
| Estella P. M. Ma, | 2 |
| Max de Castro Magalhaes | 2 |
| Santosh Maruthy | 2 |
| Youri Maryn | 2 |
| Miriam van Mersbergen | 2 |
| Nick Miller | 2 |
| Thomas Murry | 2 |

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|---------------------------|---|
| Chayadevie Nanjundeswaran | 2 |
| Hee-June Park | 2 |
| Emine Petekkaya | 2 |
| Nelson Roy | 2 |
| Juliana Nunes Santos | 2 |
| Sven Saussez | 2 |
| Ronald C. Scherer | 2 |
| Antonio Schindler | 2 |
| Hagit Shoffel-Havakuk | 2 |
| Susanna Simberg | 2 |
| M. Preeti Sivasankar | 2 |
| Eui-Suk Sung | 2 |
| Hamdi Tasli | 2 |
| Jhonatan da Silva Vitor | 2 |
| RuiQing Wang | 2 |
| Christopher R. Watts | 2 |
| Hui Yang | 2 |
| Muhammet Yildiz | 2 |

APPENDIX II

Detailed list of authors with III rank (2020)

| Authors | No of articles |
|-----------------------------|-----------------------|
| Fabian Unteregger | 2 |
| Flurin Honegger | 2 |
| Claudio Storck | 2 |
| Jack J. Jiang | 2 |
| VyVy N. Young | 2 |
| Jerome R. Lechien | 2 |
| Veronique Delvaux | 2 |
| Bernard Harmegnies | 2 |
| Sven Saussez | 2 |
| Sara Abu-Ghanem | 2 |
| Shu Wei Tsai | 2 |
| Liang-Chun Shih | 2 |
| Edward J Damrose | 2 |
| Chih-Kwang Sung | 2 |
| Daniel A. Benito | 2 |
| Ashley P. O'Connell Ferster | 2 |
| Dale C. Ekbom | 2 |
| Maude Desjardins | 2 |
| David E. Rosow | 2 |
| Ben Barsties v. Latoszek | 2 |
| Hamide Ghaemi | 2 |
| Ali Dehqan | 2 |
| Behrooz Mahmoodi-Bakhtiari | 2 |
| Helena Daffern | 2 |
| Sten Ternstrom | 2 |
| Ketaki Vasant Phadke | 2 |
| Jan G. Svec | 2 |
| Molly L. Erickson | 2 |
| Irma Ilomaki | 2 |
| Ismail Kocak | 2 |
| Usha Devadas | 2 |
| Dionysios Tafiadis | 2 |
| Meropi E. Helidoni | 2 |
| Spyridon K. Chronopoulos | 2 |
| Evangelia I. Kosma | 2 |
| Nafsika Ziavra | 2 |
| George A. Velegrakis | 2 |
| Oguz Kuscu | 2 |
| Taner Yilmaz | 2 |
| Jackie Gartner-Schmidt | 2 |

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|------------------------------|---|
| Eric J. Hunter | 2 |
| Simone Graf | 2 |
| Jorg E. Bohlender | 2 |
| Marco Guzman | 2 |
| Amanda Flynn | 2 |
| Vrushali Angadi | 2 |
| Joseph Stemple | 2 |
| Hamdi Tasli | 2 |
| Hakan Birkent | 2 |
| Omer Karakoc | 2 |
| Mert Cemal Gokgoz | 2 |
| Peak Woo | 2 |
| Seyyedeh Maryam Khoddami | 2 |
| Geun-Hyo Kim | 2 |
| Yeon-Woo Lee | 2 |
| Soon-Bok Kwon | 2 |
| Banafshe Mansuri | 2 |
| Farhad Torabinezhad | 2 |
| Ali Ashraf Jamshidi | 2 |
| Behnoosh Vasaghi-Gharamaleki | 2 |
| Leila Ghelichi | 2 |
| Anna Alice Almeida | 2 |
| Patricia McCabe | 2 |
| Catherine Madill | 2 |
| Timothy Pommee | 2 |
| Youri Maryn | 2 |
| Camille Finck | 2 |
| Dominique Morsomme | 2 |
| Daniela Da Silva Goncalves | 2 |
| Adrian Castillo | 2 |
| Javiera Castillo | 2 |
| Alvaro Reyes | 2 |
| Nader Al Souky | 2 |
| Bakr Saridar | 2 |
| Pierre Richard Abi Akl | 2 |
| Sami Azar | 2 |
| Gabriel J. Cler | 2 |
| Cara E. Stepp | 2 |
| Dimitar D. Deliyski | 2 |
| Robert E. Hillman | 2 |
| Daryush D. Mehta | 2 |
| Maria Sobol | 2 |
| Ewelina M. Sielska-Badurek | 2 |
| Anna Rzepakowska | 2 |

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|------------------------|---|
| Ewa Osuch-Wojcikiewicz | 2 |
| Maryam Dastoorpoor | 2 |
| Vanessa Veis Ribeiro | 2 |

APPENDIX III

Detailed list of International collaboration (2019)

| International collaboration | No of articles |
|------------------------------------|-----------------------|
| Belgium, Austria | 1 |
| South Africa, Belgium | 1 |
| Japan, Belgium, Netherlands | 1 |
| Italy, Sweden | 1 |
| UK, India | 1 |
| USA, Sweden, India | 1 |
| Belgium, Netherlands, Lithuania | 1 |
| USA, France, India, Jordan | 1 |
| Poland, USA | 1 |
| Germany, Austria | 1 |
| Austria, UK | 1 |
| Chile, Finland | 1 |
| China, USA | 6 |
| Norway, Finland | 3 |
| Argentina, Columbia | 1 |
| UK, Australia | 1 |
| Czech Republic, Finland | 1 |
| Ireland, UK, Australia | 1 |
| Italy, USA | 1 |
| Iran, Canada | 1 |
| Portugal, USA | 1 |
| Spain, Poland | 2 |
| Iran, USA | 1 |
| Canada, Luxemborg, Belgium | 1 |
| Czech Republic, Egypt, Finland | 1 |
| Belgium, Germany | 1 |
| Egypt, USA | 1 |
| Spain, USA | 1 |
| Denmark, UK | 1 |
| Belgium, France | 1 |
| USA, Brazil | 1 |
| Germany, USA | 1 |
| Iran, Germany | 2 |

APPENDIX IV

Detailed list of International collaboration (2020)

| International collaboration | No of articles |
|------------------------------------|-----------------------|
| China, USA | 2 |
| Turkey, USA | 3 |
| Ireland, UK, Australia | 1 |
| Belgium, Germany | 1 |
| Argentina, Brazil, UK | 1 |
| Sweden, Netherlands | 1 |
| Denmark, UK | 1 |
| Finland, Switzerland | 1 |
| Italy, Belgium | 1 |
| Mexico, USA | 1 |
| Greece, Cyprus | 2 |
| Portugal, USA, Sweden | 1 |
| Iran, USA | 1 |
| Finland, Czech Republic | 2 |
| Peru, Chile | 1 |
| Sweden, UK | 1 |
| Italy, Jordan | 1 |
| Iran, Belgium, South Africa, UK | 1 |
| USA, Netherlands | 1 |
| USA, UK | 1 |
| Columbia, Chile | 1 |
| Belgium, Netherlands | 1 |
| Egypt, USA | 1 |
| Spain, USA | 1 |
| Belgium, France | 1 |
| Japan, USA | 1 |
| Canada, Australia | 1 |
| France, USA | 1 |
| Spain, Portugal | 1 |
| Chile, Australia | 1 |
| Greece, UK | 1 |
| Sweden, USA, India | 1 |
| Australia, Egypt | 1 |
| Australia, Brazil | 1 |

APPENDIX V

Detailed list of funding agencies (2019)

| Funding agency | No of articles funded |
|---|------------------------------|
| Bio & Medical Technology Development Program of the NRF funded by the Korean government | 2 |
| Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ) | 2 |
| Czech Science Foundation | 2 |
| Deutsche Forschungsgemeinschaft (DFG) | 2 |
| Iran University of Medical Sciences | 2 |
| Oskar Oflund Foundation | 2 |
| Sichuan Science and Technology Department Fund | 2 |
| Action Medical Research, The Hugh Fraser Foundation, and Jeffrey Charitable Trust | 1 |
| AIISH research fund | 1 |
| Aina Borjeson's Fund | 1 |
| American Speech-Language-Hearing (ASH) Foundation Clinical Research Grant | 1 |
| APART grant, Austrian Academy of Sciences | 1 |
| Cheng Hsin General Hospital | 1 |
| Clinical Research grant (Pusan National University Hospital) | 1 |
| Drexel University | 1 |
| Emil Aaltonen Foundation | 1 |
| Financiadora de Estudos e Projetos | 1 |
| Fundacao de Apoio a Pesquisa do Estado do Rio Grande do Norte—FAPERN | 1 |
| Fundação para a Ciência e a Tecnologia | 1 |
| German Research Foundation (DFG) | 1 |
| Gulhane Medical School | 1 |
| Hacettepe University Research Fund | 1 |
| Lamar University Visionary Grant Initiative | 1 |
| LIFE—Leipzig Research Center for Civilization Diseases, University of Leipzig | 1 |
| MINCYT-CONICET and COLCIENCIAS Argentina-Colombian Bilateral Project | 1 |
| Ministry of Education Humanities and Social Sciences Fund Project in China | 1 |
| Ministry of Science and Technology, Taiwan | 1 |
| Musculoskeletal Rehabilitation Research Center | 1 |
| National Health and Medical Research Council of Australia | 1 |
| Natural Science Fund of Guangdong China | 1 |
| National Institutes of Health grant | 1 |
| Novice researcher grant (City Hospitals Sunderland NHS Foundation | 1 |

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|---|---|
| Trust) | |
| OHSU's Department of Otolaryngology-Head and Neck Surgery | 1 |
| Scientific Research Project (BAP) | 1 |
| Shiraz University of Medical Sciences | 1 |
| Swedish Research Council | 1 |
| Tempo Voice Center | 1 |
| The Goldschmidt Jacobson Foundation and the Gottfried Bangerter-Rhyner Foundation | 1 |
| The Office of the Vice President for Research at Purdue University | 1 |
| The postgraduate college of the Mater Hospital | 1 |
| The University of Sydney Dr Liang Voice Program. | 1 |
| TUBITAK & Cukurova University Scientific Research Unit | 1 |
| UMONS-Communaute Francaise de Belgique | 1 |
| Zahedan University of Medical Sciences | 1 |

APPENDIX VI

Detailed list of funding agencies (2020)

| Funding agency | No of articles funded |
|---|-----------------------|
| Fondo Nacional de Desarrollo Científico y Tecnológico FONDECYT | 2 |
| Coordenação de Aperfeiçoamento de Pessoal de Nível Superior-Brazil (CAPES) | 2 |
| Social Sciences and Humanities Research Council of Canada (SSHRC) | 2 |
| Diane M. Bless Endowed Chair | 2 |
| Iran University of Medical Sciences | 2 |
| Region Vastra Gotaland | 2 |
| National Science Foundation | 1 |
| Fundação de Amparo a Pesquisa do Estado de São Paulo (FAPESP) | 1 |
| Fundação Araucária de Apoio ao Desenvolvimento Científico e Tecnológico do Paraná | 1 |
| University Malaya Research Grant | 1 |
| National Natural Science Foundation of China | 1 |
| Japan Society for the Promotion of Science - KAKENHI | 1 |
| Ludwig Maximilian University of Munich | 1 |
| The medicine faculty of Toulouse University-Paul Sabatier | 1 |
| Dr Liang Voice Program at The University of Sydney | 1 |
| Fundação de Amparo a Pesquisa da Bahia (FAPESB) | 1 |
| French National Research Agency | 1 |
| Clinical Investigations Department at Naval Medical Center San Diego | 1 |
| Japanese Foundation for Research and Promotion of Endoscopy Grant | 1 |
| Allied Health Research Committee Hunter New England Health grant | 1 |
| Drexel University | 1 |
| Fundação para a Ciência e a Tecnologia | 1 |
| University of Illinois at Urbana-Champaign | 1 |
| Israel Defense Forces (IDF) Medical Corps and Directorate of Defense Research & Development, Israeli Ministry of Defense (IMOD DDR&D) | 1 |
| The ministry of science and arts (Baden-Württemberg, Germany) | 1 |
| Finnish Work Environment Fund | 1 |
| LIFE – Leipzig Research Center for Civilization Diseases, University of Leipzig | 1 |
| The Department of Otolaryngology, Stanford University School of Medicine | 1 |
| Ahvaz Jundishapur University of Medical Sciences | 1 |
| Clinical and Translational Science Center at Weill Cornell Medical College | 1 |
| Otolaryngology departmental funds, California | 1 |

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|---|---|
| University of Washington Speech and Hearing Sciences Vocal Function Lab | 1 |
| Small Project Grant—Hong Kong University | 1 |
| Ministry of Economy and Competitiveness (MINECO), Spain | 1 |
| Communaute Francaise de Belgique | 1 |
| Music and Health Science Research Collaboratory (MaHRC) | 1 |
| Complete Vocal Institute | 1 |
| Swedish Research Council | 1 |
| University of Arizona Office for Research and Discovery | 1 |
| Novafon GmbH | 1 |
| School of Medical Sciences, National University of Rosario | 1 |
| Beijing Municipal Administration of Hospital Clinical Medicine Development of Special Funding Support | 1 |
| National Research Foundation of Korea, Ministry of Education, Science and Technology | 1 |
| Alexander von Humboldt Foundation | 1 |
| APART grant, Austrian Academy of Sciences | 1 |