

# An Analysis of the Mutual Publications of Anatomists and Otorhinolaryngologists: A Bibliometric Study based on the Web of Science Database

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**Citation:** Tekin AM, Bahsi I. An analysis of the mutual publications of anatomists and otorhinolaryngologists: a bibliometric study based on the web of science database. Tr-ENT 2021;31(4):86-93. <https://doi.org/10.26650/Tr-ENT.2021.1033996>

## ABSTRACT

**Objective:** The aim of this study is to bibliometrically examine the mutual studies in the fields of anatomy and otorhinolaryngology (ORL) recorded in the Web of Science (WoS) database between 1980-2020.

**Material and Methods:** The mutual publications of anatomists and otolaryngologists on 31.01.2021 are listed in the Science Citation Index-Expanded category of the Advanced Search section of the WoS database. Thus, in the search field tags, Department of Anatomy for anatomists and Department of Ear, Nose, and Throat (ENT) or Department of Otorhinolaryngology or Clinic of ENT or Clinic of Otorhinolaryngology for otolaryngologists were used for the address section. Publications from 2021, meeting abstracts, proceedings papers, early accesses, and book chapters were excluded. After the exclusion criteria were applied, the bibliometric characteristics of the remaining publications were examined.

**Results:** After the exclusion criteria were applied, 1395 articles were found. The total number of citations made to these articles was 42537, and at least one citation was made to 1279 of the 1395 articles (91.68%). The h-index of these articles was 82, and the average number of citations was 30.49. In these articles, the most frequently used first five keywords were immunohistochemistry (44 times), rat (39 times), cochlea (38 times), anatomy (36 times), and facial nerve (27 times).

**Conclusion:** The results of our bibliometric study which evaluated the last 40 years of data in terms of networks, collaborations, and institutions could be an inspiration and source for future researchers. We may state that with the increasing technology, the applicability of interventional methods in the field of ORL might be increased by conducting more anatomical studies and yield safer results.

**Keywords:** Anatomy, otorhinolaryngology, article, bibliometric analysis

## INTRODUCTION

Anatomy is one of the oldest fields of medicine that examines the organs that make up the body and the functionality between these organs (1, 2). In this long process, the mysteries of the human body have become more understandable thanks to anatomical dissections (1). Especially with the development of high-resolution imaging methods in the last half-century, radiological and clinical studies have been added to anatomic cadaver studies (3). Continuously increasing technological developments have also increased the capacity of medical imaging techniques and have enabled a more detailed and accurate understanding of anatomical structures (4). In this way, the functions and anatomy of these structures

and the relationship between them can be investigated in more detail, and solutions are sought for complex clinical situations (5). Thanks to many anatomical studies in the field of otorhinolaryngology (ORL), a more detailed understanding of the structures has been provided, the relationship of these structures with clinical situations can be evaluated, and even the surgical methods to be applied can be planned (6-9).

Many researchers need to collaborate in medical publications, unlike in other fields (10). This is because co-authorship is essential in the emergence of publications in the medical field (11). Bibliometric analysis is gaining in importance and evaluates existing research data accurately and efficiently on an evidence-based basis (12, 13). Bibliometric analysis is a

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**Submitted:** 15.12.2021 • **Accepted:** 08.12.2021 • **Published Online:** 04.01.2022



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compelling method for predicting the change and evolution of a research field (11, 13). It can also provide evidence for a better understanding of the developmental trend in a particular area (14, 15). Bibliometry evaluates the productivity of countries and institutes, as well as objective analysis such as a change in research topics (15, 16).

The Web of Science (WoS) database is one of the most popular databases used in bibliometric research today (13, 17). One of the most critical criteria of international productivity is the number of articles in the WoS database and the number of citations made to these articles. Since this criterion is seen as an indicator of quality, it can be widely used in the evaluation of countries, institutions, and academicians (17).

As a result of the detailed literature review, it was seen that although there have been separate bibliometric studies conducted in the field of anatomy (5, 11), and ORL (18), no bibliometric study evaluating the joint publications of both fields was found.

The aim of this study is to bibliometrically examine the joint studies in the fields of anatomy and ORL recorded in the WoS database between 1980-2020.

## MATERIAL AND METHODS

The mutual publications of anatomists and otolaryngologists on 31.01.2021 are listed in the Advanced Search section of the WoS database. Thus, in the search field tags, Department of Anatomy for anatomists and Department of Ear, Nose, and Throat (ENT) or Department of Otorhinolaryngology or Clinic of ENT or Clinic of Otorhinolaryngology for otolaryngologists were used for the address section [AD= (Dept ENT\* OR Dept Otorhinolaryngol\* OR ENT Clin\* OR Otorhinolaryngol Clin\*) AND AD= (Dept Anat\*)].

Firstly, in the index section of the WoS, the Science Citation Index-Expanded (SCI-E) category was selected. Later, publications from 2021, meeting abstracts, proceedings papers, early accesses, and book chapters were excluded. After the exclusion criteria were applied, bibliometric characteristics of the determined publications, such as the distribution of the country and institutes, distribution of keywords, the journals they were published in, number of articles, and number of citations, were examined. VOSviewer (Visualizing scientific landscapes) software was used for the detailed analysis of bibliometric data (12).

## RESULTS

As of 31.01.2021, the number of articles published mutually by anatomists and otorhinolaryngologists between 1980-2020 in SCI-E indexed journals in the WoS database was determined as 1596. After the exclusion criteria was applied, 1395 articles were found. The distribution of these articles by year is given in Figure 1. It was determined that the number of citations made to these articles was 42537, and the distribution of citations by years is given in Figure 2. It was determined that at least one citation was made to 1279 of 1395 (91.68%) articles. The h-index of these articles was 82, and the average number of citations was 30.49.

The top 25 countries with the most articles are shown in Table 1. The first five of these countries were Japan (n: 303, 21.72%), the USA (n: 301, 21.58%), Germany (n: 223, 15.99%), South Korea (n: 178, 12.76%), and Turkey (n: 127, 9.10%), (since studies with authors from more than one country were not excluded in this distribution, the total value was more than 100%).

The number of publications from the top 20 most productive institutes is shown in Table 2. The top 5 ranks were Yonsei University (n: 81, 5.81%), Umea University (n: 72, 5.16%), the

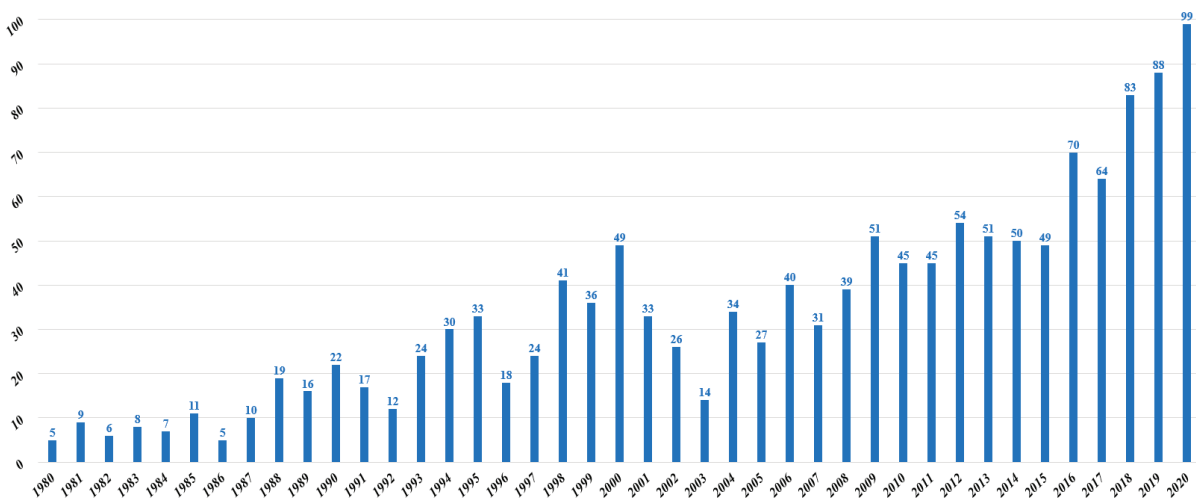


Figure 1: Annual trend of publications on analysis of mutual publications of anatomists and otorhinolaryngologists (1980-2020).

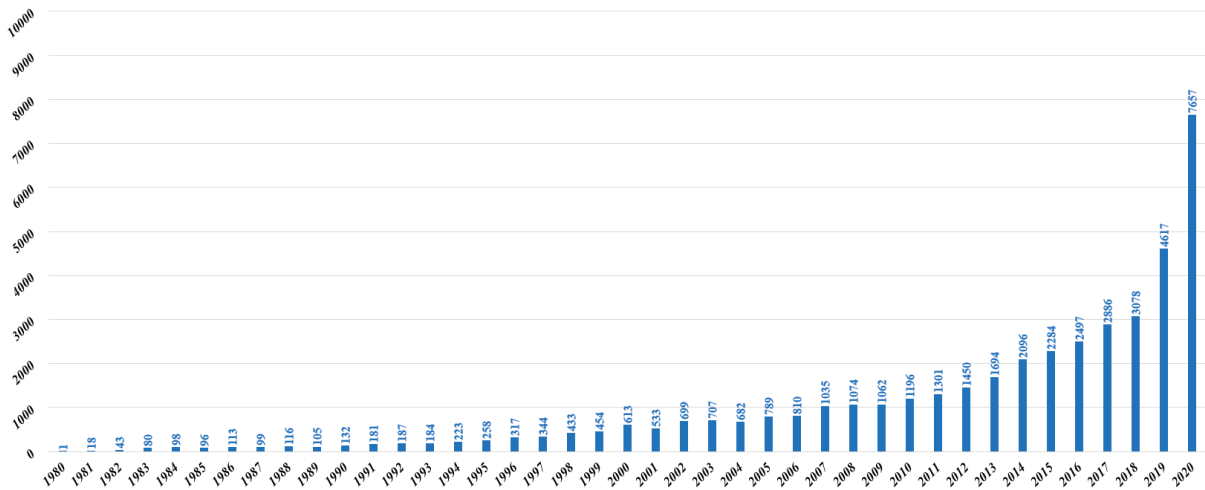


Figure 2: Annual trend of total citations on analysis of mutual publications of anatomists and otorhinolaryngologists (1980-2019).

Table 1: The number of mutual publications of anatomists and otorhinolaryngologists of the top 25 countries.

| Country         | Number of publications | Percent |
|-----------------|------------------------|---------|
| Japan           | 303                    | 21.720  |
| USA             | 301                    | 21.577  |
| Germany         | 223                    | 15.986  |
| South Korea     | 178                    | 12.760  |
| Turkey          | 127                    | 9.104   |
| Sweden          | 114                    | 8.172   |
| Peoples R China | 94                     | 6.738   |
| Netherlands     | 80                     | 5.735   |
| France          | 77                     | 5.520   |
| Australia       | 75                     | 5.376   |
| Belgium         | 73                     | 5.233   |
| England         | 70                     | 5.018   |
| Italy           | 68                     | 4.875   |
| Spain           | 68                     | 4.875   |
| Canada          | 60                     | 4.301   |
| Finland         | 57                     | 4.086   |
| India           | 55                     | 3.943   |
| Austria         | 53                     | 3.799   |
| Greece          | 50                     | 3.584   |
| Norway          | 41                     | 2.939   |
| Switzerland     | 41                     | 2.939   |
| Brazil          | 39                     | 2.796   |
| Romania         | 37                     | 2.652   |
| Iran            | 34                     | 2.437   |
| Portugal        | 33                     | 2.366   |

Table 2: The number of mutual publications of anatomists and otorhinolaryngologists of the top 20 institutes.

| Institute                             | Number of publications | Percent |
|---------------------------------------|------------------------|---------|
| Yonsei University                     | 81                     | 5.806   |
| Umea University                       | 72                     | 5.161   |
| University of California System       | 67                     | 4.803   |
| University of Cologne                 | 61                     | 4.373   |
| Kyushu University                     | 48                     | 3.441   |
| Chinese University of Hong Kong       | 45                     | 3.226   |
| Karolinska Institutet                 | 41                     | 2.939   |
| Kyung Hee University                  | 41                     | 2.939   |
| Seoul National University             | 40                     | 2.867   |
| University of Helsinki                | 39                     | 2.796   |
| University of Oslo                    | 36                     | 2.581   |
| Johns Hopkins University              | 35                     | 2.509   |
| National Institutes of Health         | 35                     | 2.509   |
| University of Western Australia       | 35                     | 2.509   |
| University System of Maryland         | 35                     | 2.509   |
| Friedrich Schiller University of Jena | 34                     | 2.437   |
| Harvard University                    | 33                     | 2.366   |
| State University System of Florida    | 33                     | 2.366   |
| University of Barcelona               | 33                     | 2.366   |
| University of Maryland Baltimore      | 32                     | 2.294   |

**Table 3: The number of mutual publications of anatomists and otorhinolaryngologists of the top 25 journals.**

| Journal  | Number of publications | Percent |
|--|------------------------|---------|
| Acta Oto Laryngologica                                 | 78                     | 5.591   |
| European Archives of Oto Rhino Laryngology             | 56                     | 4.014   |
| Laryngoscope   | 36                     | 2.581   |
| Hearing Research                                       | 35                     | 2.509   |
| Journal of Laryngology And Otology                     | 28                     | 2.007   |
| Annals of Otology Rhinology And Laryngology            | 23                     | 1.649   |
| Surgical And Radiologic Anatomy                        | 23                     | 1.649   |
| Brain Research   | 21                     | 1.505   |
| Annals of Anatomy Anatomischer Anzeiger                | 18                     | 1.290   |
| International Journal of Pediatric Otorhinolaryngology | 16                     | 1.147   |
| Neuroscience Letters                                   | 15                     | 1.075   |
| Auris Nasus Larynx                                     | 14                     | 1.004   |
| Clinical Anatomy                                       | 14                     | 1.004   |
| Otolaryngology Head And Neck Surgery                   | 14                     | 1.004   |
| Otology Neurotology                                    | 14                     | 1.004   |
| Plos One   | 14                     | 1.004   |
| Journal of Neuroscience                                | 13                     | 0.932   |
| Romanian Journal of Morphology And Embryology          | 13                     | 0.932   |
| Cell And Tissue Research                               | 12                     | 0.860   |
| Lancet   | 12                     | 0.860   |
| Neuroscience   | 12                     | 0.860   |
| Journal of Craniofacial Surgery                        | 11                     | 0.789   |
| Experimental Neurology                                 | 10                     | 0.717   |
| Scientific Reports                                     | 10                     | 0.717   |
| American Journal of Rhinology Allergy                  | 9                      | 0.645   |

University of California System (n: 67, 4.80%), the University of Cologne (n: 61, 4.37%) and Kyushu University (n: 48, 3.44%).

The top 25 journals with the most articles are shown in Table 3. The first five of these journals were Acta Oto Laryngologica (n: 78, 5,59 %), European Archives of Oto Rhino Laryngology (n: 56, 4,01%), Laryngoscope (n: 36, 2,58%), Hearing Research (n: 35, 2.50%), and Journal of Laryngology and Otology (n: 28, 2.00%).

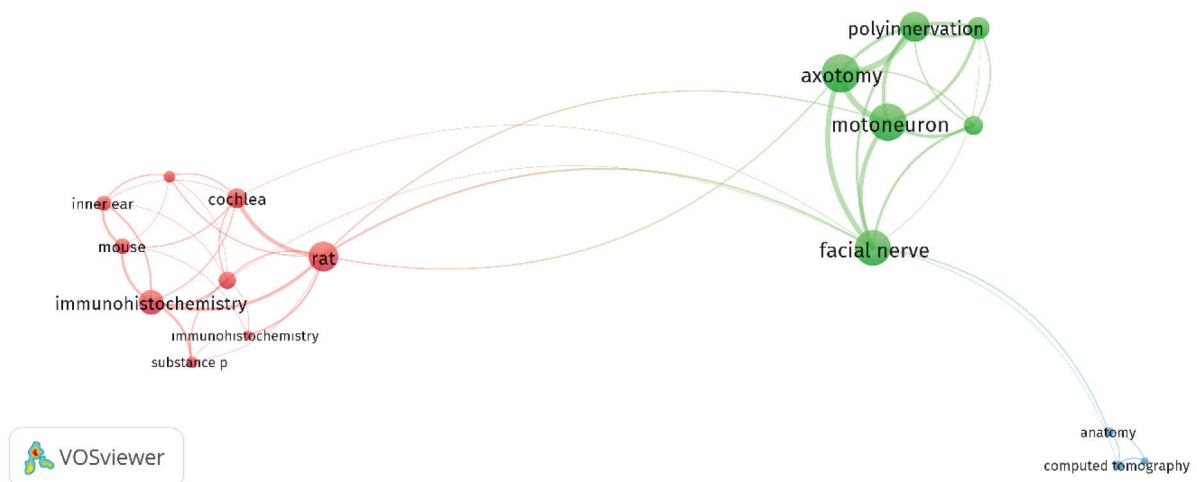
By using VoSviewer software, the distribution of the top 20 most used keywords in the examined articles were visualized and can be seen in Figure 3. The first five keywords are immunohistochemistry (44 times), rat (39 times), cochlea (38 times), anatomy (36 times), and facial nerve (27 times). By using VoSviewer software, it was determined that there was a significant change in the use of keywords between 2006-2012 (Figure 4).

By using VoSviewer software, the distribution of the top 50 most used words in the abstract of these articles were visualized and are shown in Figure 5. It was determined that there was a significant change in the use of these words between 2007-2012 (Figure 6).

## DISCUSSION

Scientific publications are generally accepted as the objective parameters of the scientific success of any institution or researcher, as well as being accepted as a way to share new medical information and current clinical practices with a wide audience (19). The productivity of countries, institutions, and international cooperation in a particular field of research can be evaluated using the bibliometric method of analysis (20).

In the present study, Japan and the USA were found to be the two leading countries with regard to the number of co-produced articles in the field of anatomy and ORL. In a study which compared the articles published in 11 journals with the



**Figure 3: Network visualization map for cluster analysis based on keyword analysis on analysis of mutual publications of anatomists and otorhinolaryngologists from 1980–2020 (the size of the circle indicates a large number of publications; thick lines indicate strong relationship and colors indicate cluster idem).**









(30). Furthermore, together with the integration of robotic techniques in cochlear implant surgery in recent years (31), many anatomical cadaver studies have been conducted which evaluated facial nerves and the other anatomic structures in the inner ear and indicated the feasibility of robotic technology (32-35). In terms of determining the boundaries of future research areas, this study shows that any technological development integrated into interventional treatment, such as in robotic cochlear implant surgery, can be supported by anatomical studies.

As part of medical education, it was emphasized that teamwork skills should be developed, and researchers should work with different disciplines where the responsibilities of health care workers are shared, and abilities overlap (36). It has been stated that anatomy studies are part of medical education along with other disciplines in cadaver studies related to the human body (37). The present study, which evaluated co-published articles in the field of anatomy and ORL over the past 40 years, shows that research between different disciplines on the subject is gradually increasing and suggests that there will be more in the future. We consider that this study might guide young researchers who plan to study in the field of anatomy and ORL in terms of ideas and foresight.

Our analyses are based on the articles reported in SCI-E in the WoS database over the last 40 years. While data analysis is relatively objective and comprehensive, it has some limitations specific to bibliometric methodology. Databases other than the WoS, for example, Scopus, Pubmed, and Google Scholar were not included since many databases could not be technically joined. Moreover, the language of WoS is English, although it is a global tool. As a result, several articles might be overlooked as articles published in other languages are not included. Finally, the database is still open, and the research can continuously be updated. Over time, these data should be updated by comparing with the results in different databases.

## CONCLUSION

Bibliometric analysis is an extremely useful tool for determining global publication trends in peer-reviewed journals and its importance is gradually increasing. Herein, we evaluated 1395 articles co-published in anatomy and ORL between 1980 and 2020 in terms of countries, institutes, journals, and keywords used. The results of our bibliometric study evaluating the last 40 years in terms of networks, collaborations, and institutions could be an inspiration and source for future researchers. We can state that with advances in technology, the applicability of interventional methods in the field of ORL might be increased by conducting more anatomical studies and yield safer results.

**Ethics Committee Approval:** Ethics committee approval was not received due to the nature of this study.

**Informed Consent:** Informed consent was not obtained due to the nature of the study.

**Peer-Review:** Externally peer-reviewed.

**Author Contributions:** Conception/Design of Study- A.M.T., İ.B.; Data Acquisition- İ.B.; Data Analysis/Interpretation- A.M.T., İ.B.; Drafting Manuscript- A.M.T., İ.B.; Critical Revision of Manuscript- A.M.T., İ.B.; Final Approval and Accountability- A.M.T., İ.B.

**Conflict of Interest:** Authors declared no conflict of interest.

**Financial Disclosure:** Authors declared no financial support.

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