

BIBLIOMETRIC ANALYSIS OF CLINICAL MEDICINE PUBLICATIONS IN
TURKEY

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**BIBLIOMETRIC ANALYSIS OF CLINICAL MEDICINE PUBLICATIONS
IN TURKEY**

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ABSTRACT

BIBLIOMETRIC ANALYSIS OF CLINICAL MEDICINE PUBLICATIONS IN TURKEY

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University ranking systems such as ARWU, HEEACT and URAP have recently started publishing field-based rankings of universities. Such rankings aim to raise awareness regarding the current status of institutions in terms of their academic productivity and publication quality in specific fields such as medicine and life sciences. However, since most global rankings consider a limited number of top ranking institutions mainly located in developed countries, it is not possible to evaluate the status of many Turkish universities in existing field-based rankings. The purpose of this thesis is therefore to draw a bibliometric profile of medical publications in Turkey to identify the current publication trends in medical subjects in reference to global publication patterns. For that purpose, a bibliometric analysis was conducted over the 33560 medicine-related articles published by Turkish universities during the years 2010 to 2012 in journals indexed by the Web of Science. In order to conduct in depth subject-based analysis of publication patterns, the publications are classified under three medical divisions by aggregating medical subject categories provided by Web of Science. This allowed us to reflect the organizational structure of medical schools at Turkish institutions in our analysis, which include internal medicine, surgical medicine and basic medical sciences.

The findings indicate that, publications in the internal medical sciences have the highest percentage among the three divisions of medical sciences. In basic medical sciences, researchers tend to publish mostly on Microbiology, Biochemistry & Molecular Biology, Biology, Biotechnology & Applied Microbiology and Cell Biology. In internal medical sciences, researchers focus on subjects such as oncology, and pediatrics. Total number of publications resulting from collaborations with foreign universities are found to be 4498. More than 50% of the collaborations were in internal medical sciences. Analysis of basic medical field collaborations indicated active contributions in topics such as biochemistry & molecular biology (337), In internal medical sciences, researchers have done more collaborations in the field of genetics (288), whereas in surgical medical sciences surgery (247) is the most popular field in terms of collaboration. When benchmarked against citation per publication values in the world, Turkish universities tend to score lower than average in almost all medical subject areas.

Keywords: bibliometrics, basic, interanal, surgical, clinical medicine

ÖZ

TÜRKİYE'DE KLİNİK TIP ALANINDAKİ YAYINLARININ BİBLİYOMETRİK ANALİZİ

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ARWU, HEEACT ve URAP gibi üniversite sıralama sistemleri son zamanlarda üniversitelerin alan bazlı sıralamalarını yayınlamaya başladılar. Buna benzer sıralama sistemleri ile üniversitelerin tıp ve yaşam bilimleri gibi özel alanlarda yayın kalitesi açısından akademik verimlilik bilincinin yükseltilmesi hedeflenmektedir.

Ancak, özellikle gelişmiş ülkelerde bulunan üst düzey kurumların, sınırlı sayıda olan alan bazlı sıralamaların kontenjablarını doldurdıkları için birçok Türk üniversitesini durumunu değerlendirmek mümkün olmamaktadır. Bu açıdan bakıldığında, bu tezin amacı tıp yayınlarının genel yayın dağılım referansı olarak tıbbi konularda güncel yayın eğilimleri belirlemek üzere Türkiye'nin bibliometrik profilini çıkarılması amaçlanmıştır. Bu amaçla, 2010-2012 yıllarında Türk üniversiteleri tarafından yayınlanan ve Web of Science tarafından tutulan 33560 tıp ile ilgili makale analiz edilmiştir. Alan bazlı yayın profilinin çıkarılması için klinik tıp alanında yayın yapan dergiler Türkiye'deki tıp fakülterinin organizasyon yapıları dikkate alınarak bu üst başlıklar altında toplanmıştır (Temel tıp, Dahili tıp, Cerrahi tıp). Web of Science veri tabanının kullandığı klinik alan kategorileri kullanılmıştır.

Yapılan bu makale işbirliklerinin %50 den fazlası dahili tıp bilimlerinde gerçekleştirilmiştir. Temel tıp bilimlerini incelediğimizde işbirliği için en çok katgıda bulunan alanlar moleküler biyoloji & biokimya (337) olduğu belirlenmiştir. Dahili tıp bilimlerinde araştırmacılar en çok genetik (288), alanlarında işbirliği yapıldığı anlaşılmıştır. Makale yayınlanması bazında son olarak cerrahi tıp bilimlerinde en çok cerrahi bilimler (247) olduğu saptanmıştır.

Sonuç olarak, dahili tıp bilimleri üniversitelerin en çok yayın çıkardıkları yayın olmuştur. Mikrobiyoloji, biyokimya & moleküler biyoloji, biyoloji, biyoteknoloji & uygulamalı biyoloji ve hücre biyolojisi temel tıp bilimlerinde; oncology, pediatric klinikal nöroloji, Farmakoloji Dahili tıp bilimlerinde; son olarak cerrahi, Peripheral daman hastalıkları, jinekoloji ve kalp damanr hastalıklarında üniversiteler yayınlarını yoğunlaştırmışlardır.

Anahtar Kelimeler: bibliometrik, temel, dahili, cerrahi, klinik tıp

**To My Family,
To URAP Center**

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LIST OF ABBREVIATIONS

ARWU	:	Academic Ranking of World Universities
CHE	:	Centre for Higher Education
CPP	:	Citation per Publication
PPF	:	Puplication Per Faculty
CPF	:	Citation Per Faculty
CWTS	:	The Centre for Science and Technology Studies
DOI	:	Digital Object Identifier
HEEACT	:	Higher Education Evaluation & Accreditation Council of Taiwan
HEI	:	Higher Education Institution
HiCi	:	Highly Cited
ISI	:	Institute for Scientific Information
JIF	:	Journal Impact Factor
PUBMED	:	Publication of Medicine
NLM	:	National Library of Medicine
SCI	:	Science Citation Index
SSCI	:	Social Sciences Citation Index
URAP	:	University Ranking by Academic Performance
VBA	:	Visual Basic for Applications
WOS	:	Web of Science

CHAPTER 1

INTRODUCTION

University ranking systems such as ARWU, QS, SCImago and URAP have recently started publishing field-based rankings of universities (Ying & Cheng, 2007; Omruuzun, 2011). Such rankings aim to raise awareness regarding the current status of institutions in terms of their academic productivity and publication quality in specific fields such as medicine and life sciences. A few Turkish universities, especially those having a medical school such as Istanbul, Hacettepe, Ankara and Ege universities, have recently succeeded in entering the top 500 to 1000 lists of many existing global rankings. However, since most global rankings consider a limited number of top ranking universities, they tend to cover institutions located in developed countries. Therefore, it is not possible to evaluate the status of many Turkish universities in existing field-based editions of global rankings.

National rankings of universities offer more in depth view of institutions located in a particular country in terms of their overall academic performance. URAP-TR is the only ranking system available for making such comparisons among Turkish institutions. The results of the URAP-TR ranking of Turkish universities indicate that institutions with a school of medicine tend to have higher academic productivity as compared to those institutions that do not have a school of medicine (Alasehir et al., in press). This study also showed that the number of medicine related publications is considerably higher than publications in any other discipline in Turkey. However, national rankings such as URAP-TR compares institutions at a high level, without distinguishing the many sub-fields that form the broad field of medicine. This makes it difficult to observe important details such as medical specializations among institutions and benchmarking publication profiles with respect to global patterns in specific medical fields.

In the bibliometrics and scientometrics literature, there are some studies that provide in-depth analysis of publications by Turkish institutions in the field of medicine. In a study that focuses only on the types of publications and their ratio over number of faculty members, Gulluoglu & Aktan (1998) observed that the number of scientific publications from Marmara University School of Medicine, and all of Turkey in general, have increased along with the increase in national income, research budgets, and the number of academic staff in universities. In addition to this, there are studies that focus on the medical publications of a specific institution. For instance, Tonta & Ilhan (2002) conducted a bibliometric analysis of a total of 1.434 articles published between 1988 and 1997 by researchers affiliated with Hacettepe University Faculty of Medicine and indexed in the MEDLINE database. When the papers were distributed over the departments in FMHU, the authors found that Pediatrics were the most active area, followed by Neurosurgery, Obstetric and Gynecology and Pediatric Surgery. Finally, there are some case studies that compare the performance of two countries in a specific medical subject area. For instance, Rashidi, Rahimi & Delirrad (2013) did a comparative analysis of parasitology publications in Turkey and Iran. When the authors compared the productivity of Turkish and Iranian parasitologists', they observed that the number of publications has almost tripled for Turkey, from 12 papers in 2002 to 36 papers in 2011, and decupled for Iran, from 10 papers to 123 from 2002 to 2010. The average number of citations per article is approximately 5.8 and 4 for Turkish and Iranian parasitology papers, respectively.

Even though there are in depth studies of medical publications originated from Turkey in the literature, existing studies either focus on identifying the performance of a particular medical school in Turkey or comparing the performance of all Turkish institutions to another country in a specific medical subject. None of the existing studies offer systematic comparisons among Turkish institutions in terms of their contributions to specific medical subject areas. Moreover, existing studies tend to focus on either the frequency of publications or overall citation counts, without distributing them to specific subject areas, or benchmarking them with respect to global averages in those medical fields. In order to provide a complete bibliometric profile, several metrics such as number of publications, number of citations, citations per publications, publications per faculty, citations per faculty in specific subject areas need to be considered together as they complement each other as performance indicators. Existing studies also do not focus on comparisons in terms of the level of international collaboration indicated by the co-authorship information provided in publications.

This thesis study aims to address these gaps in the literature by providing a bibliometric profile of medical publications in Turkey to identify the current publication trends in medical subjects in reference to global publication patterns. For that purpose, a bibliometric analysis was conducted over 33560 medicine-related articles published by Turkish universities during the years 2010 to 2012 in journals indexed by Web of Science. In order to conduct in depth subject-based analysis of publication patterns, the publications are classified under three medical divisions by aggregating medical subject categories provided by the Web of Science database. This allowed us to reflect the organizational structure of medical schools at Turkish institutions in our analysis, which include internal medicine, surgical medicine and basic medical sciences. Bibliometric indicators such as publications, citations, citations per publications, publications per faculty, citations per faculty were computed for each medical subject area and division. Normalized values such as citations per publications in specific medical subjects are also benchmarked against world averages in those subject areas obtained from another database called InCites which is operating on Web of Science. The general aim of the study is to provide an overall profile of the status of general medical publication trends in Turkey and to identify if there are subject areas where specific institutions distinguish themselves from other institutions in terms of their academic performance.

The rest of the thesis is organized as follows: Chapter 2 provides a literature survey that consists of four main parts: related disciplines, indicator terminologies, related studies and research questions. This chapter provides an overview related disciplines and existing studies on assessing academic output and performance in medicine. In chapter 3 the data resources, the data collection process and the taxonomies used for organizing the medical subjects will be presented. Statistical analysis of the data will be presented in Chapter 5. The thesis will conclude with a discussion of main findings and pointers for future work.

CHAPTER 2

LITERATURE SURVEY

This chapter is organized in three main parts. First, recently emerged academic disciplines such as Bibliometrics, Scientometrics and Informetrics in which this study is situated will be introduced in their historical order of development. Next, definitions of frequently used bibliometric indicators for studying institutional publication trends will be given. Finally, a review of related studies on bibliometric analysis of medical publication trends in Turkey and in the world will be provided.

2.1. Related Disciplines

This section provides a brief overview of the disciplines Webometrics, Bibliometrics, Scientometrics and Informetrics related to this thesis study in the order of their historical development. Even though they originate from different research areas, these disciplines have commonalities in terms of their interest towards published documents (e.g. web pages or scientific publication) and analyzing their relationships (e.g. formalized as web links or citations) with each other by using quantitative methods. Björneborn & Ingwersen (2004) illustrated the relationship between these disciplines in Figure 2.1

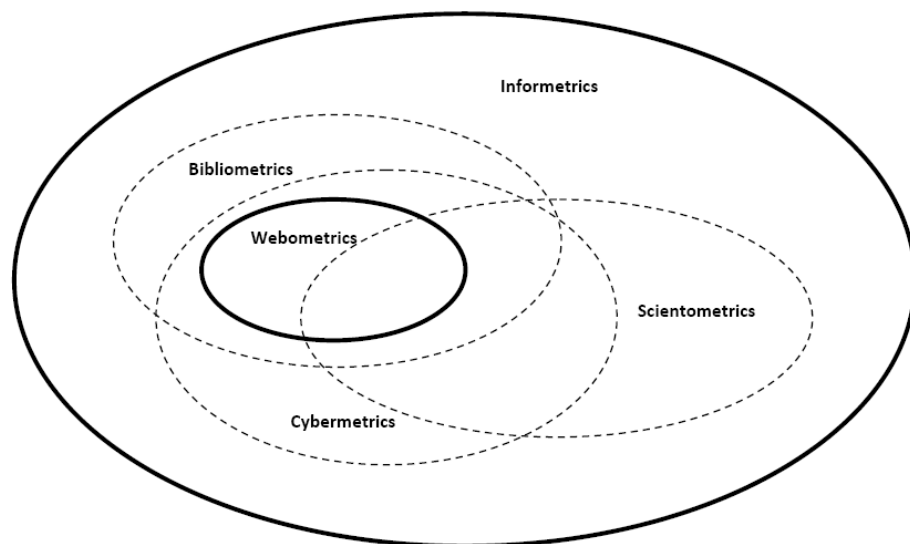


Figure 2.1. The interrelation of webometrics and bibliometrics, cybermetrics, informetrics and scientometrics

2.1.1. Webometrics is a scientific discipline which studies the quantitative aspects of information sources on the World Wide Web and their relationships. In other words, webometrics aims to develop measures for quantifying the content and the interrelationships among hyperlinked documents on the World Wide Web (Thelwall, 2008). Such studies have originated as a consequence of research on information retrieval, which led to the development of algorithms such as Page Rank (Page, Brin, Motwani & Winograd 1999) for measuring the impact of a website based on its backlinks from other web sites. Similar algorithms based on quantitative analysis of links and content form the backbone of many existing web search engines. Due to this discipline's focus on quantitative analysis of web links/citations and content, Bar-Ilan (2008) argued that Webometrics can be considered as a subfield of Informetrics, which focuses on quantitative analysis of all kinds of information resources.

In the context of quality assessment in higher education, webometric measures are used for ranking universities across the world in terms of their web visibility and the richness of their web content. The Webometrics Ranking of World Universities (<http://www.webometrics.info>) developed by the Cybermetrics Lab in Spain ranks 20,000 universities based on their web visibility and activity. Visibility is measured over the number of links the institution's web domain receives from third party institutions. Activity is split into three equal subcategories, namely presence (the number of web pages), openness (number of rich files hosted) and excellence (number of papers in the top 10% of each subject area). The basic assumption is that a university's web presence, which can be measured with the help of webometric techniques, correlates positively with the academic performance and reputation of that institution among other institutions in the globe.

2.1.2. Bibliometrics is the quantitative analysis of documents in scientific communication by means of their bibliographic content (Bellis, 2009). The term was first introduced by Alan Pritchard in a paper published in 1969, where he defined the term as "the application of mathematics and statistical methods to books and other media of communication" (Pritchard, 1969, pp. 348-349). Citation analysis and content analysis are commonly used in bibliometrics. While bibliometric methods are most often used in the field of library and information science, bibliometrics have wide applications in other areas. In fact, many research fields use bibliometric methods to explore the impact of their field, assess the impact of a set of researchers, or the impact of a particular paper. Bibliometric methods are increasingly being used by the administrators and funding agencies for the purpose of quantifying research performance of institutions and researchers, which has stirred up controversy among scientists regarding what aspects of science can be adequately quantified with these techniques (Henderson, & Shurville & Fernstrom, 2009). In addition to this, bibliometric indicators continue to serve as the main resource for global university rankings such as ARWU, Leiden, HEEACT and URAP.

2.1.3. Cybermetrics is the quantitative study of information sources, structures and technologies on the Internet; including communicational content such as messages posted to discussion groups and email communication. Thus, cybermetrics covers the term Webometrics. While Webometrics studies on the Web, Cybermetrics deals with whole internet (Björneborn, 2004).

2.1.4. Informetrics is the formal analysis of information streams in networks by using mathematical and statistical methods. The term informetrics first appeared in the title of a seminal book in library and information science by Egghe & Rousseau (1990), titled "Informetrics: Quantitative Methods in Library, Documentation and Information Science".

Even though the term originated in the context of library and information science, its focus has broadened into all quantitative aspects of information including its production, dissemination and use (Egghe & Rousseau, 1990). Given its broader coverage, Informetrics is said to encompass the fields Scientometrics and Bibliometrics (Hood & Wilson, 2001).

2.1.5. Scientometrics is broadly focused on the quantitative aspects of science (Tague-Sutcliffe, 1992). By its nature, the published literature of science and technology is an important source of information for this field. Moreover, Scientometrics is not restricted with the scope of a particular scientific discipline, and it encompasses the quantitative study of people, groups, matters and phenomena in science and their relationships (Vinkler, 2010).

Overall, there are several disciplines concerned with quantifying the structure of information and the patterns of relationships among those structures in various domains including the scientific literature. The proliferation of digital databases and the World Wide Web has opened up new ways to study the quantitative properties of scientific publications by taking advantage of their digitized content and the links between them as captured by their bibliographic content. This study aims to apply some of the measures developed particularly in Bibliometrics and Scientometrics to quantitatively analyze the research output of Turkish universities in clinical medicine. The conceptual background for the employed measures is provided in the next section.

2.2. Bibliometric Resources and Indicators

In this section terms related with field-based academic performance evaluation of universities, based on bibliometric data resources are presented.

2.2.1. Citation Databases

Eugene Garfield's paper on citation indexing in 1955 and pilot projects directed in 1960s mark the inception of citation databases for bibliometric studies (Hood & Wilson, 2001). With the advances in computer and internet technologies, citation databases have been improved in terms of coverage, functionality and timeliness. Today, citation databases track millions of publications in thousands of journals for hundreds of areas and fields in tens of disciplines. They provide functionalities such as searching, analyzing and reporting of records. The records may include latest publications as well as publications in 1800s. At the present time, there are many multidisciplinary or discipline based databases, such as Web of Science and Pubmed.

2.2.1.1. Web of Science (WoS)

Eugene Garfield's studies led to the foundation of Institute for Scientific Information (ISI) in 1960. The first multidisciplinary database, named Science Citation Index, was introduced by ISI (acquired by Thomson Reuters in 1992). This is followed by the development of Social Sciences and Arts & Humanities citation indexes which are all combined under Web of Science in web environment (Yancey, 2005).

2.2.1.2. Pubmed

PubMed is an open source interface for the MEDLINE database of references and abstracts on life sciences and biomedical topics. The United States National Library of Medicine (NLM) at the National Institutes of Health maintains the database as part of the Entrez system of information retrieval and covers over 9 million articles, some dating back to 1960, from nearly 4,000 scientific and medical journals. It is reputed to be the most frequently used medical database (Ojasoo & Hervémaisonneuve & Doré, 2001). However, Pubmed lacks key bibliometric features such as tracing the number of citations a paper gets from other documents in Pubmed. This is because Pubmed is primarily designed as a search engine over the MEDLINE database. In contrast to resources such as WoS or Scopus, Pubmed provides a more comprehensive coverage of the medical literature in terms of the number of indexed journals and document types. However, the lack of information on citing documents makes it impossible to carry out citation-based impact analysis in Pubmed.

2.2.1.3. InCites

Recent interest from administrators and funding agencies for assessing academic performance of institutions and researchers have led to the development of new interfaces that allow additional analytics and visualization to help such user groups' decision making processes. InCites is one such interface that provides basic bibliometric statistics and visualizations over the WoS database (<http://incites.isiknowledge.com/>) WoS is specifically designed to study bibliometric properties of document sets. InCites builds on basic features of WoS to help users analyze bibliometric data at the level of institutions and countries, which aim to support basic comparisons and benchmarking analysis.

2.2.2. Bibliometric Indicators

This subsection reviews the main bibliometric and scientometric concepts that will be used in the thesis to construct a profile of Turkish universities in terms of their contributions to the medical literature.

2.2.2.1. Publication

Publications are the basic unit of scholarly communication where researchers communicate their findings and arguments with the rest of the scientific community. In bibliometric terms, it corresponds to the number of scientific publications of an institute for a well-defined time range. The coverage of the term varies according to how it is described in a bibliometric database. For instance, Web of Science includes information about articles, review articles, letters, and conference proceeding papers, meeting abstract, editorial material, Correction, Biographical-Item, News Item, and Book Review. While counting all types of documents is a possibility, most bibliometric studies focus mainly on peer reviewed articles as they conform to higher standards of academic merit. Publication count can be perceived as an indicator of both size and productivity. It means that if an institution is crowded in terms of faculty members it is most likely that the total number of publication will be higher. Therefore, publications quantify the amount of research activity in an institution, but it does not necessarily provide information about the quality of the research published by that institution.

2.2.2.2. Citation

Citation is a convention used in scholarly publications to provide reference to previously published studies whose content is used as a resource for discussion. In mathematical terms, it defines a relation between two studies, citing and cited ones. A document's number of citations represents the magnitude of attention the idea expressed in that document has attracted from other researchers. Thus, it can be perceived as a quality or impact indicator to some extent. However, the size of an institution may also affect the citation count because as the number of publications increase the likelihood of attracting more citations also increase. Moreover, certain document types such as review papers tend to attract more citations, possibly because they serve as a useful resource for other researchers who aim to summarize the state of the art in a field as they report their findings.

2.2.2.3. Citation per Publication (CPP)

It is the average number of citations received by a single scientific document. It is used as an impact indicator for evaluating the average impact of documents published by a researcher or an institution. In the scientific literature the majority of the papers receive zero or a single citation. Hence, the number of citations per publication aims to improve upon pure measures of the number of publications or citations by controlling for the situation where an institution has several publications that are not cited. However, this measure needs to be interpreted in reference to a specific field. Since different fields such as medicine and basic sciences have different CPP distributions as compared to social sciences, CPP is most informative when it is normalized for a particular field (Waltman & Eck & Leeuwen & Visser & Raan, 2011). Moreover, the influence of recency on CPP should also be taken into account as more recent papers require some time to accumulate citations. For that reason, like citation values, CPP measures should be considered for a longer duration of time to obtain reliable measures of performance.

2.2.2.4. Journal Impact Factor

Journal Citation Reports (JCR) of ISI Web of Knowledge offers various performance metrics in order to enable evaluation of journals critically by examining more than 5,000 journals, 15 million citation from 1 million source articles in each year (Garfield, 2006). Journal Impact Factor is the oldest and best known journal performance indicator. It can be found by dividing the number of citations in selected year by the total number of articles distributed in the two previous years (Figure 0.2). A journal's impact factor for the year 2012 is as below ("JCR-Web 4.5 Journal Information," n.d.):

$$\text{Impact Factor of a journal in 2012} = \frac{\text{number of times articles published in 2010 and 2011 were cited in 2012}}{\text{number of articles published in 2010 and 2011}}$$

Figure 2.2 Journal Impact Factor Calculation

Journal Impact Factor can be used as a weight for classifying publications in terms of their potential impact. Publishing a paper in a high impact journal is general considered to be more prestigious among scientists, as such journals tend to be followed by many researchers in the field. However, factors that impact CPP also influence JIF values, since there are important differences among fields in terms of the number of journals and their citation patterns. Since

this thesis focuses on the field of medicine only, JIF measures are assumed to be a reliable metric for assessing the quality of an institution's contributions to the field of medicine.

2.2.2.5. Collaboration

In the context of bibliometrics and scientometrics, collaboration is used as a measure of publications that are jointly produced by researchers from different institutions. Co-authorship patterns captured by collaboration measures is an important aspect of scientometric studies as they reveal which institutions tend to collaborate in what subject areas. In this thesis, collaboration among medical schools in Turkey are investigated in terms of the number of co-authored publications in clinical medicine related fields.

2.3. Related Studies.

In this section related work in the fields of scientometrics and medical informatics that study publication patterns in medical fields are reviewed. Our review indicated that related work can be grouped based on their focus of analysis. The first section review studies that focus on the research output in medicine at the level of countries and institutions. Next, studies that focus on bibliometric profiles of medical journals are reviewed. Finally, studies that focus on specific subject areas under clinical medicine are reviewed. These studies are relevant for the current thesis since our goal is to draw a bibliometric profile of medical publications contributed by Turkish universities in terms of their distribution into specific subject areas and journal types.

2.3.1 A comparison of evaluation metrics for medical publication in terms of Institution or Country

Tonta & Ilhan (2002) conducted a bibliometric analysis of a total of 1.434 articles published between 1988 and 1997 by researchers affiliated with Hacettepe University Faculty of Medicine (FMHU) and indexed in MEDLINE. When the papers were distributed over the departments in FMHU, the authors found that Pediatrics were the most active area, followed by Neurosurgery, Obstetric and Gynecology and Pediatric Surgery. According to Tonta & Ilhan, (2002), researchers from FMHU most frequently published at pediatrics journals. This is not surprising according to the authors because the Department of Pediatrics of FMHU distinguished itself at the time as one of the most prolific departments within FMHU. In addition to this, the highest number of publications appeared in the Turkish Journal of Pediatrics (TJP), which is published by the Institute of Child Health of Hacettepe University since 1993.

Robert, Wilson, Donnadieu, Gaudy & Arreto (2006) investigated 2443 papers that were published in 2006 by researchers from the European Union countries on pain-related research. The authors aimed to identify which EU countries led the pain related publications and which journals EU authors tend to publish their pain related work. The results indicated that five EU countries (the UK, Germany, Italy, the Netherlands and France) published the majority of the papers. The 2443 papers analyzed by the authors were published in 592 different journals and they most frequently appeared in Cephalalgia, Pain and European Journal of Pain journals. The authors also compared the output of EU researchers with US researchers and found a significant difference in terms of their overall contributions to pain literature. The authors argued that this difference could be due to difference between the gross-domestic product of EU countries and USA.

Thirdly, Bajwa & Yaldram (2013) conducted an analysis of the research trends in Pakistan in the field of biotechnology for the period 1980 - 2011. The authors observed that starting with just 15 publications in 1980 with a negligible annual growth rate for the initial 15 years, the number of publications reached 3,273 in 2011 with an annual growth rate of 22 % for the last 15 years. This growth in publications is studied through factors such as Relative Growth Rate and Doubling Time. The rise in the number of publications can be associated with the establishment of a number of dedicated centers in biotechnology combined with a well coordinated science and technology policy of the government during the period 2000 - 2010. The establishment of Biotechnology Commission during this period also had a very positive effect according to the authors.

In a similar study, He, Zhang and Tang (2005) analyzed the publication patterns in China in biochemistry and molecular biology. The authors found that during 1999-2002, Chinese researchers (including those from Hong Kong and Macao, and excluding those from Taiwan) published 4502 papers in the 272 biochemistry and molecular biology journals indexed in the SCI-Expanded list. During the same period, there were 181748 papers published in the 272 biochemistry and molecular biology journals worldwide. Based on a yearly analysis, the rates of increase for Chinese papers were 5.96%, 19.53% and 8.83% respectively, with an average rate of increase of 12.61% each year. These results showed that there were increasing trends for Chinese papers in biochemistry and molecular biology both in the total number in the percentage in the world publications. The ratio of publications in China to the total in the world has consistently increased from 1999 to 2005.

Another motivation for conducting bibliometric analysis of medical papers in a specific country is to assess the quality of the publications in terms of the impact they generate in the field. For instance, in many countries like Turkey, academic appointments and promotions are increasingly determined by the quantity and quality of international publications (Gulluoglu & Aktan, 1998). This requires an evaluation of each academician's publications. In a study that focuses only on the types of publications and their ratio over number of faculty members, Gulluoglu & Aktan observed that the number of scientific publications from Marmara University School of Medicine, and all of Turkey in general, have increased along with the increase in national income, research budgets, and the number of academic staff in universities. In this study, original, peer-reviewed articles were weighted higher than letters, meeting abstracts, or reviews.. Finally, the authors argued that Turkey's status in international scientific rankings have increased as a consequence of the recent increase in the number of international publications in medicine.

Finally, Rashidi, Rahimi & Delirrad (2013) did a comparative analysis of parasitology publications in Turkey and Iran. When the authors compared the productivity of Turkish and Iranian parasitologists', they observed that the number of publications has almost tripled for Turkey, from 12 papers in 2002 to 36 papers in 2011, and decupled for Iran, from 10 papers to 123 from 2002 to 2010. The average number of citations per article is approximately 5.8 and 4 for Turkish and Iranian parasitology papers, respectively. The Veterinary Parasitology journal was the most cited journal in both countries. The majority (more than 90%) of cited items were foreign journal articles and one half of all references in journals articles dated 11 and 12 years while one half of cited books was dated within 14 to 16 years for Turkish and Iranian papers, respectively.

Table 2.1 Summary of evaluation metrics used for investigating medical publication trends in an institution or in a country

Author(s), publication date	Period	Database(s)	Institutions or Country	Data Collection
Tonta & Ilhan (2002)	1988-1997	MEDLINE	Hacettepe University Faculty of Medicine	Report the findings of the bibliometric characteristics (medical journals and their impact factors, among others) of a total of 1.434 articles published
Robert, Wilson, Donnadieu. Gaudy & Arreto (2006)	2006	The ISI Web of Knowledge	UK, Germany, Italy, the Netherlands and France each published > 200 papers	The raw data for this study were retrieved from two medical Contents: Clinical Medicine and Life Sciences
Bajwa & Yaldran (2013)	1980 - 2011	Scopus	Pakistan	A broad search was carried out using keyword bio* The initial output data that was retrieved was cleaned by removing irrelevant and repeated records. Journals with zero impact factor were also removed from the record. Finally 18,085 publications were considered for further analysis
He, Zhang & Teng (2005)	1999-2002	Web of Knowledge ISI	China	The total number of publications affiliated with China and their citation numbers were found and the most cited articles were investigated. There were 181748 papers published in the 272 biochemistry and molecular biology journals worldwide.
Rashidi, Rahimi & Delirrad (2013)	2002-2011	Web of Knowledge ISI	Iran and Turkey	The Web of science database was queried based on the term "Iran and Turkey" in the "address" field and refined by "Parasitology" as a subject category on 31 December of 2011. There were 323 and 678 publications that met the

				selection criteria for Turkey and Iran, re-spectively.
Gulluoglu & Aktan (2000)	1991-1998	Web of Knowledge ISI	Marmara University School of Medicine	For each year, the number of publications and the rate of publications per faculty member (PPF) were calculated. To estimate quality, the publications were split into two groups: original, peer-reviewed articles versus letters, meeting abstracts, and reviews

2.3.2 A comparison of evaluation metrics for medical publication in terms of Journals

Several studies focus on the bibliometric profile of specific journals in clinical medicine. Such studies aim to identify which journals stand out among other journals in specific medical fields, what kind of papers and topics attract the greatest number of citations, and authors from which countries tend to publish high impact research. For instance, Kostoff (2007) found that The Journal of Lancet stand out among other medical journals due to the number of highly cited papers it has. Kostoff's analysis pointed out that papers that receive high number of citations tend to be accrued by large-scale clinical drug trials on breast cancer, diabetes, coronary circulation, and immune system problems. Such papers also tend to have many co-authors.

Journal of Pediatric Surgery is another journal subjected to bibliometric analysis due to the number of highly cited articles it published. A study by Celayir, Sander, Elicevik, Vural & Celayir (2008) indicated that the most cited articles, authors and institutions originated from the USA and English-speaking countries. The gastrointestinal system, respiratory system, urology and oncology were the leading topics and diaphragmatic hernia were the most common special topics for the highly cited articles.

Some studies aim to identify the publication trends in specific journals and comment on their potential impact on the field in the near future. For instance, Stone, Whitham & Ghaemi (2012) showed that Psychiatric journals publish more biological studies than internal-medicine journals. According to the authors, this tendency may influence psychiatric education and practice in a biological direction, with less attention to psychosocial or clinical approaches to psychiatry.

Finally, some studies focus on publication profiles of national journals. For instance, Sanni (2011) showed that the Medical Journal of Malaysia published very few foreign contributions, which indicates that Medical Journal of Malaysia (MJM) is still very much a Malaysian-based journal reporting on issues and findings closely related to Malaysia. Even though it is being covered by Index Medicus, it is not indexed by the ISI Science Citation Index, which prefers journals with a more international appeal like most international indexes for journals. Such evaluations aim to inform the national medical journal editors in terms of the publication profiles.

Table 2.2 Summary of bibliometric studies on specific medical journals and subject areas.

Author(s), publication date	Period	Database(s)	Journal(s)	Data Collection
Kostoff (2007)	1997-1999	ISI Web of Knowledge SCI	Journal of Lancet	All documents classified by the SCI as articles and published in Lancet and summarizes most and least cited articles
Celayir, Sander, Elicevik, Vural & Celayir (2008)	1985 - 2006	ISI Web of Knowledge SCI	Journal of Pediatric Surgery, Pediatric Surgery International and European Journal of Pediatric Surgery	A total of 600 (200 from each journal) most cited articles were identified and chosen for further analysis.
Stone, Whitham & Ghaemi (2012)	2008	The Archives of Internal Medicine (AchIM) and Annals of Internal Medicine (AIM)	The Archives of General Psychiatry (AGP) and the American Journal of Psychiatry (AJP)	The authors classified abstracts and original articles as biological or non-biological. Archives of General Psychiatry and The American Journal of Psychiatry, as compared with The Archives of Internal Medicine and Annals of Internal Medicine
Sanni (2011)	2004-2008	Malaysian Abstracting and Indexing System (MyAis)	Medical journals	All Journals related with this topics

2.3.3 A comparison of evaluation metrics for medical publication in terms of Medical Subject Categories.

In a study focusing on the bibliometric profiles of Turkish institutions in the field of biomedical engineering, Tonta (2000) reviewed 8.842 articles indexed in MEDLINE and published between 1988 and 1997 by researchers affiliated with Turkish institutions. The findings indicated that Hacettepe University ranks first with 1.713 publications and produces almost a quarter (23.1%) of all biomedical publications. İstanbul University follows Hacettepe with 946 publications (12.7% of all publications) along with Ankara and Cerrahpaşa (İstanbul) Universities (773 and 507 publications, respectively). In other words, more than half (53%) of all biomedical publications were produced by the abovementioned four institutions. In a follow up study based on *Science Citation Index* data for the years 1981 through 1993, Onat and Yazıcı (1994) found that the weight of the Hacettepe, İstanbul, Cerrahpaşa (İstanbul) and Ankara medical schools in terms of number of publications within the total has decreased from

84% to 45%, which indicate the increasing number of contributions originating from other universities in Turkey to this field of biomedical engineering.

Tsay & Chen (2005) analyzed and compared journal citation data, from Journal Citation Reports on the Web 2000, of general/internal medicine and surgery fields. General and internal medicine covers resources on medical specialties such as general medicine, family medicine, internal medicine, clinical physiology, pain management, and military and hospital medicine. Surgery covers resources on general surgical topics including the different types of surgery (cardiovascular, neurosurgery, orthopedic, pediatric, or vascular); allied disciplines of surgery (surgical oncology, pathology, or radiology); and surgical techniques (arthroscopy, microscopy, or endoscopy). The source items and five kinds of citation data (citation counts, impact factor, immediacy index¹, citing half-life² and cited half-life³) were considered in the analysis. The impact factor and immediacy index were found to have significant correlation with citation counts. A significant correlation also exists between impact factor and immediacy index values for both fields. However there is no correlation between cited half-life and other citation data, except citing half-life.

Thirdly, in order to identify and characterize the most highly cited clinical research articles published in the journal *Sepsis*, a comprehensive list of citation classics in sepsis was generated by searching the database of Web of Science-Expanded. Each eligible article was reviewed for basic information, including country of origin, article type, journals, authors, and funding sources. A total of 2,151 articles were cited more than 100 times; the 50 top-cited clinical articles were published between 1974 and 2008. The number of citations ranged from 372 to 2,932, with a mean of 678 citations per article. These citation classics came from nine countries, of which 26 articles came from the United States. Rush University and the University of Pittsburgh lead the list of classics with six papers each. The 50 top-cited articles were published in 17 journals, with the *New England Journal of Medicine* and *Journal of the American Medical Association* topping the list. The top 50 articles consisted of 21 clinical trials and 29 observational studies. To conclude bibliometric analysis provides a historical perspective on the progress of clinical research on sepsis. Articles originating from the United States and published in high-impact journals are most likely to be cited in the field of sepsis research. (Tao, Zhao, Lou, Bo, Wang & Deng, 2008).

Finally, as part of a bibliometric analysis of the quantity and citation impact of scientific papers in the field of complementary and alternative medicine, Fu, Xu, Zhao, Huang & Chen (2011) analyzed the document types, geographical and institutional distribution of the authorship, including international scientific collaboration. The findings indicated that international co-authorship in the complementary and alternative medicine field has increased swiftly day by day. Moreover, internationally collaborated publications produce higher citation impact than papers published by authors from particular country

¹ The journal immediacy index is a measure of how quickly the "average article" in a journal is cited. It is calculated by dividing the number of citations to articles published in a given year by the number of articles published in that year. It will tell one how often articles published in a journal are cited within the same year.

² The citing half-life is the number of publication years from the current year that account for 50% of the current citations published by a journal in its article references. This figure can help one evaluate the age of the majority of articles referenced by a journal.

³ The cited half-life is the number of publication years from the current year which account for 50% of current citations received. They basically reflect the timeliness with which articles in a journal are citing other articles, and are cited by other articles. This figure can help one evaluate the age of the majority of cited articles published in a journal.

Table 2.3 Description of criterion evaluation metrics for medical publication in terms of Subject Categories.

Author(s), publication date,	Period	Database(s)	Subject(s)	Data Collection
Sun (2012)	2002, 2005, 2008, and 2011	ISI Web of Knowledge SCI	Otolaryngology	Otolaryngology topics were grouped as general, pediatrics, oncology, otology and neurotology, sleep disorders, sinonasal disease, facial plastics, and/or Otolaryngology
Sampson, Horsley & Doja (2013)	January 2001 to January 2010	MEDLINE	Medical education studies	They searched MEDLINE for evaluative medical education studies published in these journals during this period and classified them as quantitative or qualitative studies according to MEDLINE indexing
Bas & Yaprak & Yuzer & Tokat (2011)	1980 - 2011	ISI Web of Knowledge SCI	Liver transplantation	A retrospective search was performed using key words "liver transplantation," "hepatic transplantation," "liver transplant," and "hepatic transplant." We further analyzed these results by the "analyze" function of the software in terms of number of papers for each country, type of documentation, number of publications per year, journal, institute, and author.
Tasli & Kacar & Ertugrul & Aydemir (2012)	1999–2003 and 2004–2008	ISI Web of Knowledge SCI	Dermatology	The publications, citations received, and the h-index under the category of "dermatology" in 43 journals according to the ISI JCR data of 2008 were examined individually for each OECD country
Xu & Chen & Shen (2003)	1984-2001	MEDLINE	Neuroscience	Publications were selected by searching "brain, cereb*, nerv*, neur*, spinal or synap* in Mesh" in any field to cover the majority of neuroscience and were taken as the World Neuroscience Output while all records in MEDLINE
DeShazo, LaVallie & Wolf (2009)	1987–2006	MEDLINE	Medical informatics	A bibliometric analysis of medical informatics citations indexed in Medline was performed using publication trends, journal frequency, impact factors, MeSH term frequencies and characteristics of citations
Morris & Mccam (1997)	1993	ISI Web of Knowledge SCI	Medical Informatics Journals	Data were performed to intercitation studies among productive journal titles, and software routines from SPSS to perform multivariate

				data analyses on cocitation data for proposed core journals.
Foo (2009)	1999-2007	ISI Web of Knowledge SCI	Medicine, General & Internal	The analysis included 15 selected journals from a pool of 100 journals in the “Medicine, General & Internal” subject category. These journals were selected as they have 9 years of available bibliographical information.
Ugolini, Cimmino, Casilli & Mela (2001)	1995-1997	ISI Web of Knowledge SCI	Ophthalmology	In this study, Data of articles published in ophthalmological journals were downloaded. Mean Impact Factor, source country population and gross domestic product were analyzed.
Zainal & Zainab (2011)	1990-2005	ISI Web of Knowledge SCI	Biomedical and health sciences	In this study, 3697 publications affiliated to Malaysian addresses from the SCI database This study also find publication productivity trends, authorship and collaboration pattern, core journals used, and citations obtained.

2.4. Objectives and Research Questions

The literature on bibliometric analysis of medical publications presented in the previous section suggests that most studies either aim to characterize bibliometric properties of specific journals or medical subject areas, or summarize the contribution of specific institutions and countries to the field of medicine. Almost all studies rely on bibliometric databases such as ISI Web of Science, Scopus or MEDLINE/PUBMED as the primary data source. Number of publications and citations as well as their distribution over specific subject areas are the primary bibliometric indicators employed by these studies.

Existing studies on the contributions of Turkish institutions to the medical literature are limited to Tonta (2000), Tonta & Ilhan (2002), Onat & Yazici (1994), which tend to focus either on a single field such as biomedical engineering or on the medical publications of a single institution such as Hacettepe University. Gulluoglu & Aktan's (1998) study covers more Turkish institutions, but it focuses on bibliometric measures such as the number/type of publications and publications per faculty. This thesis aims to contribute to this line of work by extending the scope of the analysis to a larger number of Turkish institutions and to multiple medical fields and subject areas. Since the study will focus on publications in the years 2010, 2011 and 2012, it will provide a more up to date and more comprehensive picture of the recent contributions of Turkish institutions to the field of medicine. In particular, this thesis aims to address the following research questions:

1. How do Turkish institutions with a school of medicine compare with each other in terms of their overall bibliometric profiles?
2. How do Turkish institutions with a school of medicine compare with each other in terms of their bibliometric profiles in the three medical divisions, namely basic sciences, surgical sciences and internal medicine?
3. How do Turkish institutions with a school of medicine compare with each other in terms of their overall bibliometric profiles in specific medical subject areas?
4. How does the overall performance of Turkish institutions in medical subject areas compare to the World averages in those fields?
5. How do Turkish institutions with a school of medicine compare with each other in terms of the percentage of their publications resulting from international collaboration? Is there a relationship between the level of international collaboration and overall citations received?
6. What is the frequency of articles published in high impact journals? Are there differences among institutions in terms of the distribution of their articles into low or high impact medical journals? Is there a relationship between the journal choices and overall citations received?

CHAPTER 3

METHODOLOGY

This section describes the bibliometric data sources used as well as the data collection, categorization and analysis steps performed in this study. ISI's Web of Science database is used as the primary data source for collecting bibliometric data for the publications of Turkish universities in medicine-related subjects. Web of Science (WoS) groups journals into 251 different subject areas. Among these subject categories, 57 of them are identified as medicine-related subjects. Next, these subject areas are categorized under 3 main divisions, namely Basic Medicine, Internal Medical Sciences and Surgical Sciences, which reflect the main divisions used in all medical schools in Turkey. WoS subject areas are assigned to the divisions based on their match with the names of the departments grouped under each medical division. Table 3.1. summarizes the WoS subject assignments to each medical division. 20, 23 and 14 WoS subject areas are assigned to Basic Medical Sciences, Internal Medical Sciences, and Surgical Medical Sciences divisions respectively. Some journals can be listed under multiple WoS categories, so when publications and citations are counted for the medical divisions, values obtained from such journals are equally shared among the overlapping divisions. In this study, medicine-related publications from 72 Turkish universities that have a faculty of medicine are profiled by using bibliometric methods.

Table 3.1 Faculty Of Medicine (WoS Categories) (SCI-Expanded, 2012)

Faculty of Medicine Divisions		
Basic Medical Sciences	Internal Medical Sciences	Surgical Medical Sciences
<ul style="list-style-type: none"> •Anatomy & Morphology •Biochemical Research Methods •Biochemistry & Molecular Biology •Biodiversity Conservation •Biology •Biomedical Engineering •Biophysics •Biotechnology & Applied Microbiology •Cell Biology •Developmental Biology •Evolutionary Biology •Health Care Sciences & Services •Mathematical & Computational Biology •Medical Ethics •Medical Informatics •Medical Laboratory Technology •Microbiology •Parasitology •Physiology 	<ul style="list-style-type: none"> • Allergy • Behavioral Sciences • Clinical Neurology • Dermatology • Emergency Medicine • Endocrinology & Metabolism • Gastroenterology & Hepatology • Genetics & Heredity • Geriatrics & Gerontology • Hematology • Immunology • Infectious Diseases • Medicinal Chemistry • Medicine, General & Internal • Neurosciences • Nutrition & Dietetics • Oncology • Pediatrics • Pharmacology & Pharmacy • Primary Health Care • Psychiatry • Radiology, Nuclear Medicine & Medical Imaging • Rheumatology • Sport Sciences 	<ul style="list-style-type: none"> • Andrology • Anesthesiology • Cardiac & Cardiovascular Systems • Cell & Tissue Engineering • Critical Care Medicine • Obstetrics & Gynecology • Ophthalmology • Orthopedics • Otorhinolaryngology • Pathology • Peripheral Vascular Disease • Respiratory System • Surgery • Transplantation

The following subsections provide an overview of data collection, cleaning and categorization processes. The data collection steps follows the method developed by Alasehir (2010) for ranking world universities (Figure 3.1). This method is customized to gather bibliometric data for the medicine-related publications of Turkish universities.

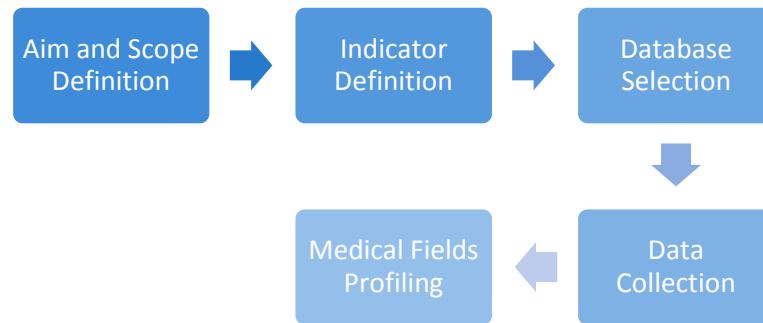


Figure 3.1 Process Steps

3.1. Aim and Scope Definition

The aim of this study is to provide an overall evaluation of the academic performance of Turkish universities in the field of medicine based on bibliometric indicators. In this thesis bibliometric data for 72 Turkish universities that have a medical school is processed between the years 2010-2012. The academic performance of institutions are evaluated based on bibliometric indicators which will be described in the next subsection. The scope of the study is limited to medical journals that are indexed in ISI's Science Citation Index and Science Citation Index-Expanded. These journals are grouped under 57 subjects, which are matched to the three main medical divisions in Turkish medical schools. The medical fields profiling that are given below are composed of 57 subject categories (figure 3.2)

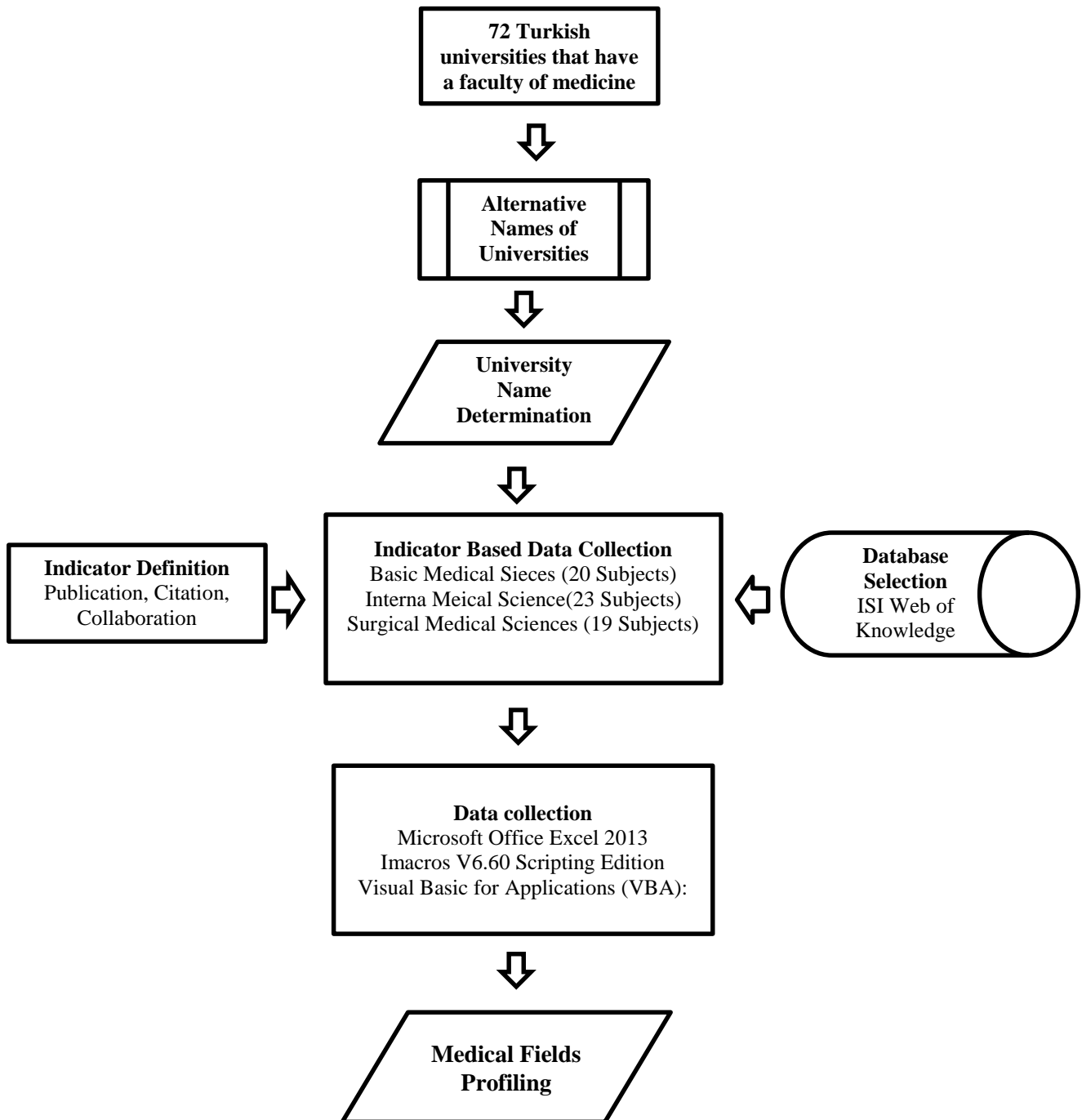


Figure 3.2 Workflow Diagram of Medical Fields Profiling

3.2. Indicator Definition

Many bibliometric indicators have been employed to assess academic quality in the related literature, as summarized in Chapter 2. The following indicators have been employed to evaluate the academic performance of the 72 Turkish universities in our sample in the field of medicine.

- **Publication:** The number of publications indexed by Science Citation Index. It is a way of measuring current scientific productivity. The data is gathered from Web of Science databases.
- **Citation:** It is an indicator to evaluate the scientific impact of publications. It is calculated by adding the number of citations received between 2010-2012 from web of science databases.

3.3. Database Selection

Pubmed and Web of Science are the most known databases which are examined below. There are many different classification systems of science. For bibliometric and scientometric purposes, the most popular classification system is Thomson Reuters' Web of Science database. This system includes about 251 research areas, referred to as subject categories. A similar categorization system is also included in the Pubmed database, which is reserved for medical publications. The classification systems of Web of Science and Pubmed work at the level of scientific journals. (Waltman & Eck, 2012). Table 3.2 provides a summary of Falagas et al.'s (2008) findings where they compared the two databases in terms of their coverage.

Table 3.2 Characteristics of PubMed and WoS databases (Falagas et al, 2008)

Characteristic	PubMed	Web of Science
No. of journals	6000 (827 open access)	8700
Focus (field)	Core clinical journals, dental journals, nursing journals, biomedicine, medicine, history of medicine, bioethics, space, life sciences	Science, technology, social sciences, arts and humanities
Period covered	1950–present	1900–present
Citation analysis	None	As for Web of Science plus the total number of articles on a topic or by an individual author cited in other articles
Updating Frequency	Daily	Weekly

Table 3.2 presents data regarding various characteristics of PubMed and Web of Science. Access to Web of Science requires a subscription, so it is not a free access database. PubMed

is a free-access database managed by National Institutes of Health in the US. PubMed focuses mainly on medicine and biomedical sciences, whereas Web of Science (Falagas et al, 2008).

Web of Science covers the oldest publications, because its archived records go back to the year 1900. WoS organizes the indexed journals under 250 subject categories, 57 of which are related to medicine. PubMed allows larger number of keywords per search but it does not provide any features for citation analysis, which is a key limitation of PubMed. PubMed is developed as a search engine to support keyword and subject category based search. For example: It is realized that both WoS and PubMed's annual number of publications have grown exponentially, however, especially after 2006. During the past decades, WoS articles on translational medical research have been produced in a range from one in 1992 to approximately 1,400 in 2011. Meanwhile, PubMed papers on translational medical research exceeded 600 papers in 2011. Due to the limitation of the retrieval time, the number of papers in 2012 is partial and thus not adopted for analysis in this paper below (Ma et al, 2012)

In conclusion, Web of Science (WoS) has been identified as the most appropriate bibliometric database for the objectives of this thesis study. Therefore, all publications on clinical medical research was collected within the online version of Science Citation Index (SCI) and Science Citation Index Expanded (SCI-E) published by Thomson Reuters and operated by Thomson Scientific in USA (Chen et al. 2007). The main advantage of the WoS journals is that they constitute the most important (in terms of impact) journals in the world (Boyack et al. 2005; Pouris and Pouris 2011). Moreover, citation data for the papers published in these journals are available in WoS

3.4. Data Collection Process

Data collection is performed in multiple stages, which are explained in detail in the following subsections. The data collection system is based on an automated process that minimize human based errors and accomplish data collection in a shorter time period. The following tools are used to develop the automated data collection program:

- **Microsoft Office Excel 2013:** It is used as a database where all of the data is stored and basic computations are performed.
- **Imacros V6.60 Edition:** It is a data extraction tool developed by iOpus Software GmbH. Information recovery processes are conducted with the help of Imacros' scripting edition. It has been chosen due to many useful features it offers when compared to other internet macro tools. For instance, Imacros allows users to read and write data from and to different file types such as text files, databases and XML files. It's compatibility with most programming and scripting languages provides user a flexible coding environment.
- **Visual Basic for Applications (VBA):** It is an embedded platform in Microsoft Office Excel 2013. It provides the functionality of managing the Imacros V6.60 Scripting Edition by allowing user to code in Microsoft Visual Basic 6.5. Moreover, it helps to create a compatible environment for Microsoft Excel and Imacros.

Data collection process contains the phases indicated in Figure 3.3, which is adapted from Alasehir (2010) and customized further for bibliometric data collection for medical

publications. In this part, each phase's detailed explanation and data sources as well as some examples are provided.

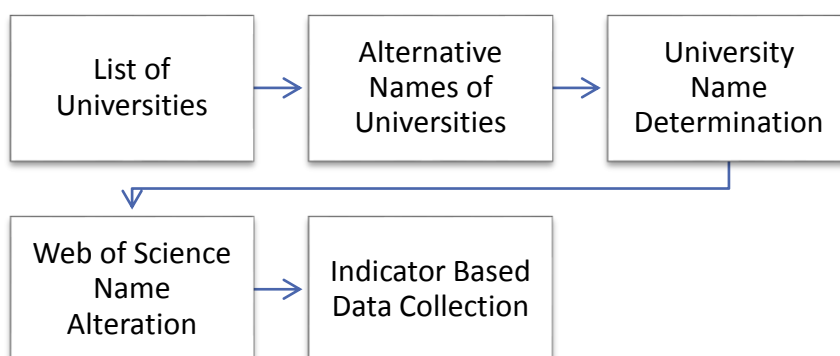


Figure 3.3 Phases of Data Collection

3.4.1. List of Institutions

The first step of the data collection process is to list the 72 Turkish universities with medical faculty that will be subjected to the data collection process.

3.4.2. Alternative Names of Universities

One of the most important stages of collecting bibliometric data for a university is to use all of the name alternatives of that institution as a search query in the WoS database. Most universities tend to have more than one name alternative.

In order to collect alternative names an automated script was developed for data extraction from Wikipedia. The list of universities generated in the first phase is processed by this script to find alternative names written in Wikipedia.

3.4.3. Name Disambiguation for Universities

The objective of this step is to generate a final list of universities with the best name alternatives. In order to generate such a list, all universities are tested from WoS database manually and a new list is created with the columns displayed in Table 3.3.

Table 3.3. Column Descriptions

Name of Column	Number of Alternates	Content of Column
Name	3	Name Alternatives of Universities
City	1	City of University
And Affil	1	University Name Restriction
OR	1	University Name Abbreviation

- Name alternatives: There are eleven columns for an institution to enter up to eleven name alternatives.

- City: This column is used for universities located in the same country which have at least one conflicting name alternative.
- AND AFFIL: It is used for some exceptional situations like medical or health science centers. .
- OR: It is inserted to enter abbreviations of institutions if exists.
- OR: It is inserted to enter abbreviations of institutions if exists.

3.4.4. Web of Science Name Alteration

In this phase, the list is converted automatically into a query phrase according to Web of Science abbreviation rules. In addition to direct conversion, name alternatives are also produced in hierarchical levels for Web of Science as indicated in Figure 3.4

The first hierarchical level, Baskent University, represents one of the name alternatives used for data collection from WoS Database. In the first attempt, the script produces two alternatives in Web of Science format. Those alternatives are given in the second level of hierarchy: “Baskent Univ” and “Univ Baskent”. The program uses those alternatives as a query string for the WoS Database. After the results returned, institution refinement process is applied in WoS Database in order to prevent unwanted results.

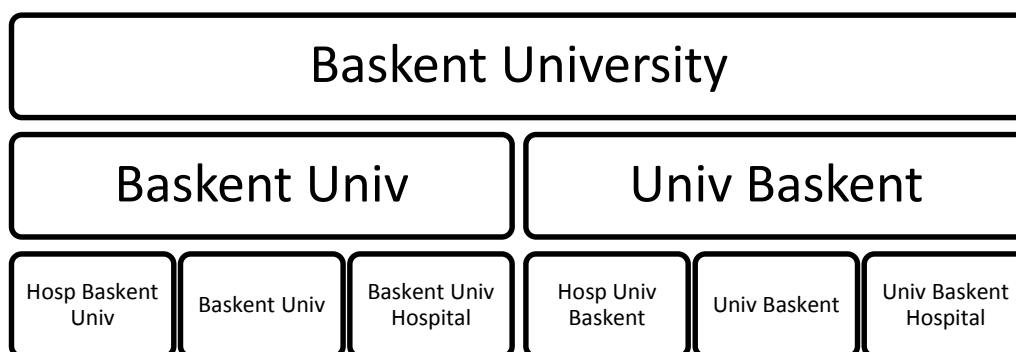


Figure 3.4. Name Alternatives in Hierarchical Level

3.4.5. Indicator Based Data Collection

By following the producing clear lists for all types of databases, the indicator based data collection phase starts. Indicator based data collection is designed to obtain article, citation, collaborations data from Web of Science. The application recovers the data of three (2010-2012) years totally. In this phase, database search queries were produced by a software developed in Microsoft Excel VBA. Afterward, embedded Imacros scripts were started for web automation in the software. If the publications and citations in journals are indexed in more than one area, these are distributed throughout the fields.

3.5. Medical Fields Profiling

Once the number of publications and citations of each Turkish university is collected, their bibliometric profile in medicine is extracted by computing the distribution of publications and citations across medical subject areas. Next, universities in Turkey are compared to each other in terms of the distribution of their publications and citations in each medical field, Secondly,

these values are benchmarked against the world averages in each medical subject area, which are obtained from InCites. The benchmarking analysis aims to identify those areas in which Turkish universities excel at maintaining world standards in bibliometric terms.

3.6. Document Type Descriptions

The following list summarizes the publication types that can be obtained through WoS queries for each Turkish university. In this study, analyses were used for all document types.

3.6.1. Article

Article contains research papers, features, brief communications, case reports, technical notes, chronology, and full papers that were printed in a journal and/or presented at a symposium or conference.

3.6.2. Meeting Abstract

A general outline of finished papers that were or will be presented at a symposium or conference.

3.6.3. Letter

Contributions or communication from the readers to the journal editor concerning previously published material.

3.6.4. Review

A renewed study of material previously studied. Includes review articles and surveys of previously published literature. Usually will not present any new information on a subject.

3.6.5. Editorial Material

An article that gives the opinions of a person, group, or organization. Includes editorials, interviews, commentary, and discussions between individual, post-paper discussions, round table symposia, and clinical conferences.

3.6.6. Proceedings Paper

Published literature of conferences, symposia, seminars, colloquia, workshops, and conventions in a wide range of disciplines. Generally published in a book of conference proceedings.

3.6.7. Other

- **Biographical-Item:** Obituaries, articles focusing on the life of an individual, and articles that are tributes to or commemorations of an individual.

- **Book Review:** A critical appraisal of a book (often reflecting a reviewer's personal opinion or recommendation) that evaluates such aspects as organization and writing style, possible market appeal, and cultural, political, or literary significance.
- **Correction:** Correction of errors found in articles that were previously published and which have been made known after that article was published. Includes additions, errata, and retractions.
- **News Item:** News, current events, and recent developments.

3.7. Limitations

Despite our best efforts to minimize them, the data collection scheme also suffer from some limitations, primarily due to the limitations present in the WoS database. First of all, WoS does not cover all medical journals in the world. There is a bias towards journals published in English and most Turkish medical journals are not indexed in WoS. The WoS database is based on publications in specific journals, and secondary information elements such as affiliation addresses and author names are not treated in the same level of precision. For instance, only journals and publications are assigned unique ids, whereas no ids are assigned to affiliated institutions and author names. This reflects the bias in the WoS database towards indexing certain type of information, namely journals and publications. This situation brings challenges to bibliometric analyses conducted at the level of institutions, because institutional names are not standardized in the database.

Some of these limitations originating from the design of the database have some implications on the accuracy of the bibliometric data collected as part of this study. Firstly, although we try to consider most naming possibilities of Turkish institutions, it is possible that the names of the institutions are incorrectly spelled in some papers, which means that such records would not be retrieved by our queries. Another limitation faced during the data collection phase was the large number of name combinations for some institutions. In the event of ignoring this problem, indicator data of the institutions can be collected incorrectly. For example, "Middle East Technical University" has lots of alternatives such as "METU", "Middle East Tech Univ", "ODTU" and "Orta Dogu Teknik Universitesi". In order to mitigate this problem 11 alternative name possibilities and abbreviations of the institutions were included into the query strings. The similarity between institution names is another key-point in the data collection phase. This problem was partially addressed by taking the location information of the institution into account. The city names were included into the query strings to disambiguate such instances. Finally, WoS's citation report interface is restricted for a maximum 10.000 documents. Indicator values were collected for each year separately to resolve this problem.

CHAPTER 4

RESULTS

The chapter provides the main results of our bibliometric analysis of medical publications contributed by 72 Turkish universities. The chapter is organized in three sections. In the first section, the results of the descriptive analysis on the number of documents and citations is presented. In the following section, detailed information is given about the journal impact factor analysis and the total number of documents published in high impact journals. The chapter concludes with the discussion of field based benchmarking analysis and an analysis of collaboration among Turkish universities .

4.1. Document And Citation Analysis

Table 4.1. Descriptive statistics of medical publications by Turkish universities

Total	33575
Article	24851
Meeting Abstract	5037
Letter	1676
Review	941
Editorial Material	669
Article; Proceedings Paper	318
Correction	67
Biographical-Item	13
News Item	2
Book Review	1

In order to analyze the general publication characteristics, publications were grouped into 7 main categories as article, meeting abstract, letter, review, editorial material, proceedings paper etc. based on the publication categories used by WoS. In addition to this, “the others” category contains 4 more sub-categories, namely Correction, Biographical-Item, News Item, and Book Review.

Turkish universities that have a school of medicine produced 24851 articles in total during 2010-2012 period, which constitutes 74% of the total number of all document types. However in the world, 1,358,479 articles were produced in the field of medicine between 2010-2012, which constitutes 56% of the total number of all document types. Meeting abstract is ranked second (15%) among the seven publication categories. As in Turkey, Meeting abstract is as ranked second (23%) among the seven publication categories in the word Letter, review and editorial material constitute 5%, 3% and 2% respectively in Turkey. Therefore, among all medical publications in the world in 2010-2012, 1.7 % are being published in Turkey. Figure

4.1. compares percentages of publication types between Turkey (left) and the World (right). The distribution of publication type percentages indicate that articles constitute a larger portion of all medical publications in Turkey as compared to the world.

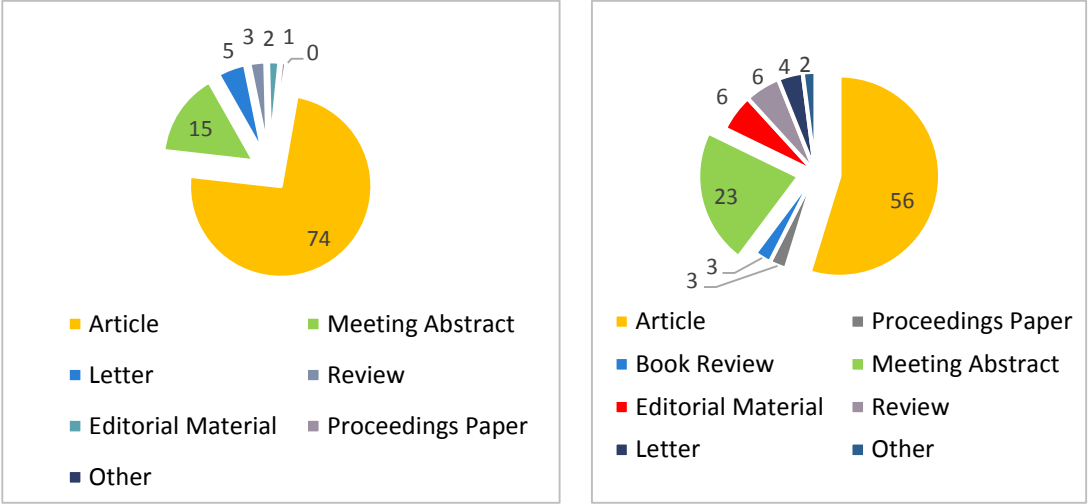


Figure 4.1. Comparison of Percentages of Publication Types between Turkey (left) and the World (right)

These results suggest that authors tend to publish journal articles rather than meeting abstract, letter, review, editorial material, or proceedings papers. This situation reflects the coverage of the WoS database which currently favors articles published in journals. Conference citation index is a recent addition to the WoS database, whose coverage is gradually expanding, so it may be misleading to interpret this percentage distribution as a general tendency suggesting that Turkish universities tend to publish more journal articles than conference papers.

Figure 4.2. displays a radar chart summarizing the percentage distribution of publications over the three main medical divisions for the top 20 Turkish universities in terms of their total publication output.

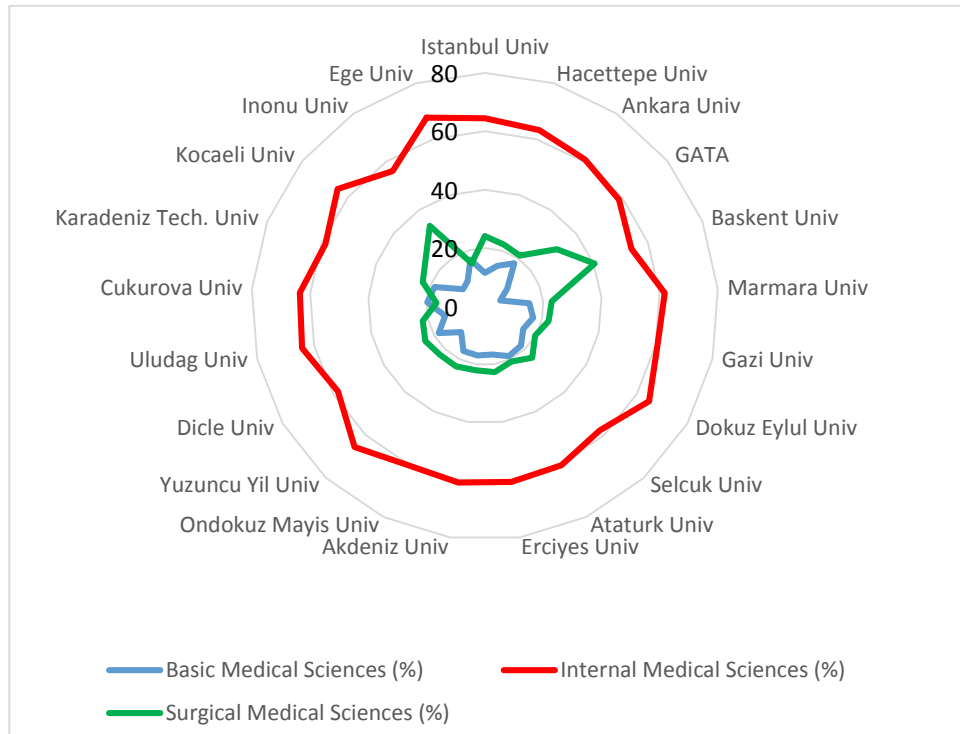


Figure 4.2. Distribution of Publication Percentage within divisions of Faculty of Medicine

According to Figure 4.2, internal medical sciences at each of these universities have the highest percentage among the three divisions of medical sciences. Surgical sciences ranks second for the majority of top publishing Turkish universities. Baskent, Inonu and Istanbul universities stand out among other Turkish universities in terms of their percentage of publications in surgical medical sciences. Overall Turkish universities tend to publish less in basic medical sciences.

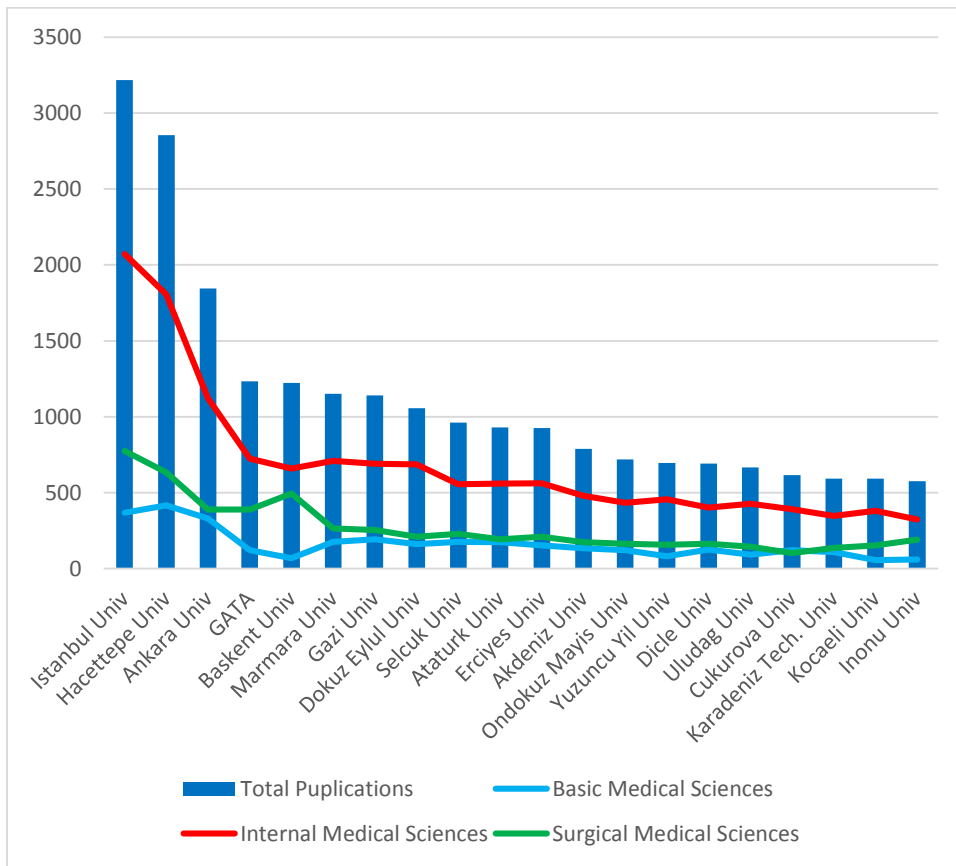


Figure 4.3. Top 20 institutions with the highest number of publications in the WoS database

Figure 4.3 presents the frequency distribution of medical publications for the top 20 most productive universities in Turkey. Istanbul (3126), Hacettepe (2855), Ankara (1844) stand out among other universities in terms of their total publication count. Publications in the field of internal medical sciences have the largest amount among other divisions. Istanbul (2072), Hacettepe (1806) and Ankara (1123) universities again constitute the top three institutions in this division. In the case of surgical sciences, Istanbul (775), Hacettepe (633), Baskent (494), GATA (389) and Ankara (390) universities form the top five, indicating their strong presence in surgery. Most Turkish institutions tend to publish less in basic medical sciences. The top 5 includes Hacettepe (416), Istanbul (470), Ankara (330), Marmara (364) and Gazi (255) universities. The results show that Istanbul University has produced 10% of the total publications in Turkey in this time interval. The full list of universities with their publication frequencies are presented in Appendix A.

Figure 4.3 displays a radar chart summarizing the percentage distribution of citations over the three main medical divisions for the top 20 Turkish universities in terms of their total publication output.

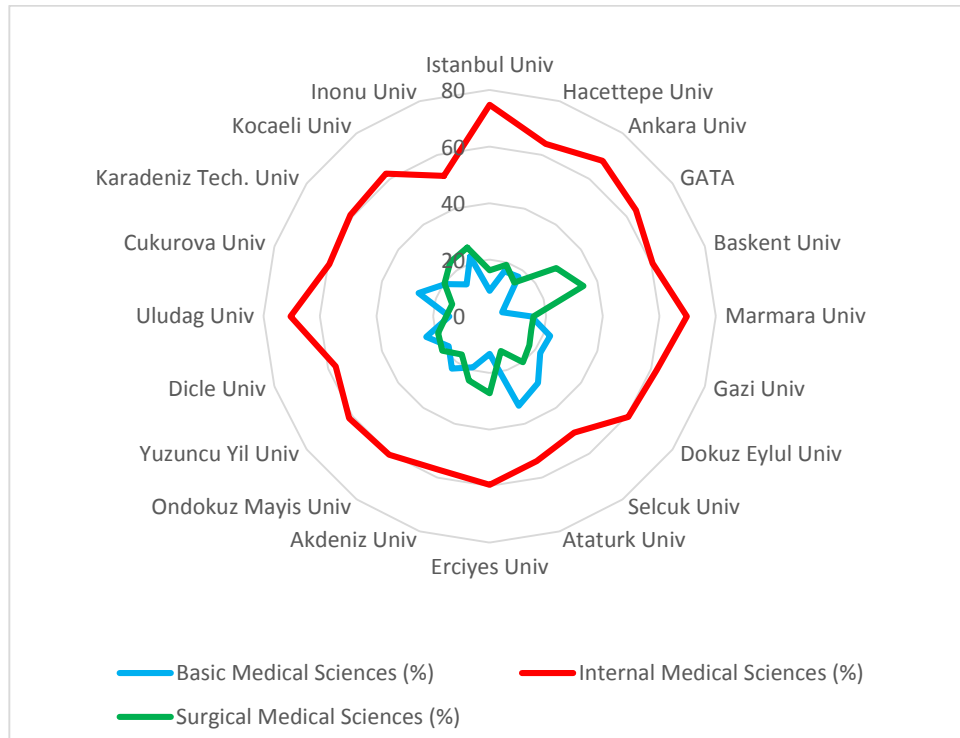


Figure 4.4. Distribution of Citation Percentage within divisions of Faculty of Medicine

According to Figure 4.4, the highest percentage of citations are received in the internal medical sciences for all Turkish universities in the top 20. Surgical sciences ranks second for the majority of Turkish universities. Baskent, Inonu and Istanbul universities stand out among other Turkish universities in terms of the percentage of citations they received in surgical sciences. In some universities such as Ataturk, Selcuk, Dokuz Eylul, Gazi, Marmara and Cukurova, basic medical sciences rank second in terms of the percentage of citations.

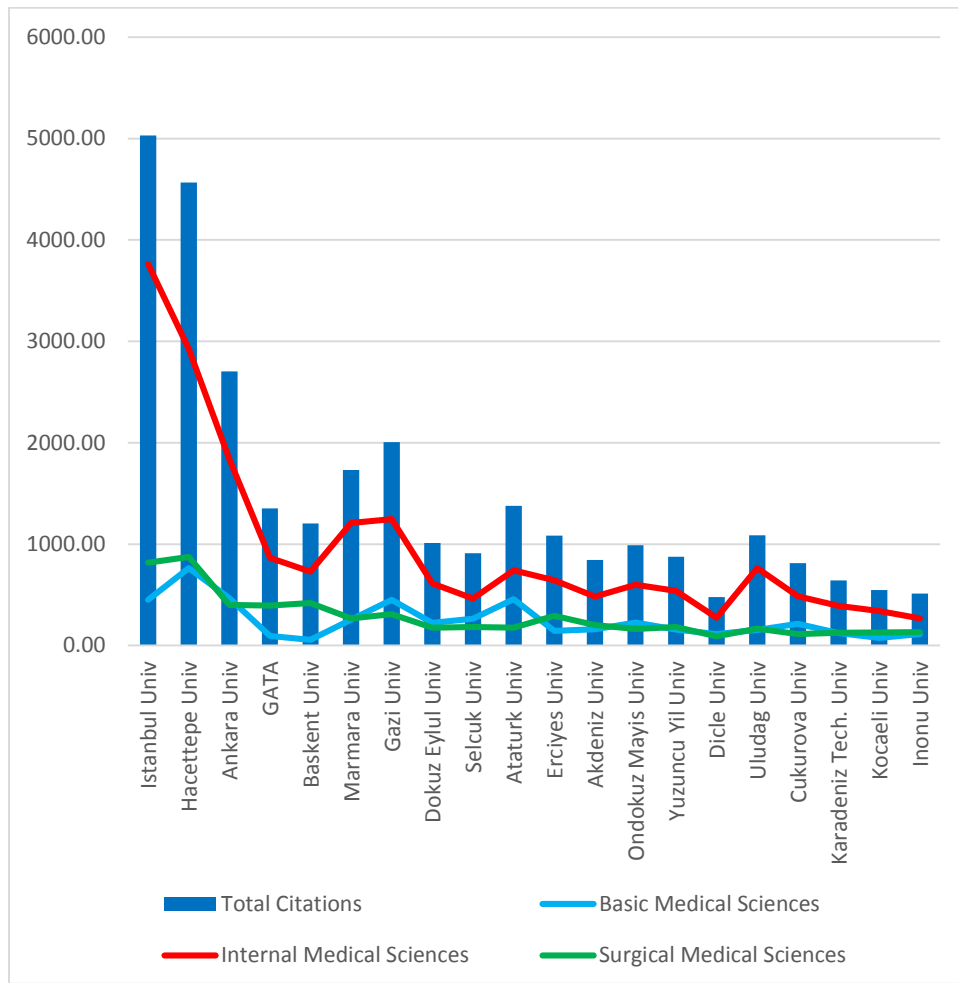


Figure 4.5. Top 20 institutions with the highest number of citations in the WoS database

Figure 4.5 displays the frequency distribution of citations for the top 20 most cited institutions. The results indicate that Istanbul University (5029) has the highest total number of citations among all universities. Hacettepe University, Ankara University and Gazi University follow Istanbul University with 4564, 2704, and 2006 total citations respectively. The number of citations parameter is important because it indicates the cumulative impact of the articles published by a university. The frequency distribution of citations follow a similar pattern compared to total publications, where Istanbul (3762), Hacettepe (2925), Ankara (1838), Gazi (1244) and Marmara (1207) form the top 5. In surgical sciences, Hacettepe (874), Istanbul (815), Baskent (419) and GATA (393) stand out among other institutions. Finally, Hacettepe (768), Istanbul (451), Ataturk (457) and Gazi (450) universities stand out in terms of the number of citations they received for their publications in the basic medical sciences division. The full list of universities with their citations are presented in Appendix B.

Citation per Publication (CPP) is an important bibliometric indicator for evaluating the average quality of publications from an institution. Figure 4.6 below shows the top 20 Turkish institutions sorted in terms of their overall CPP values in medical sciences.

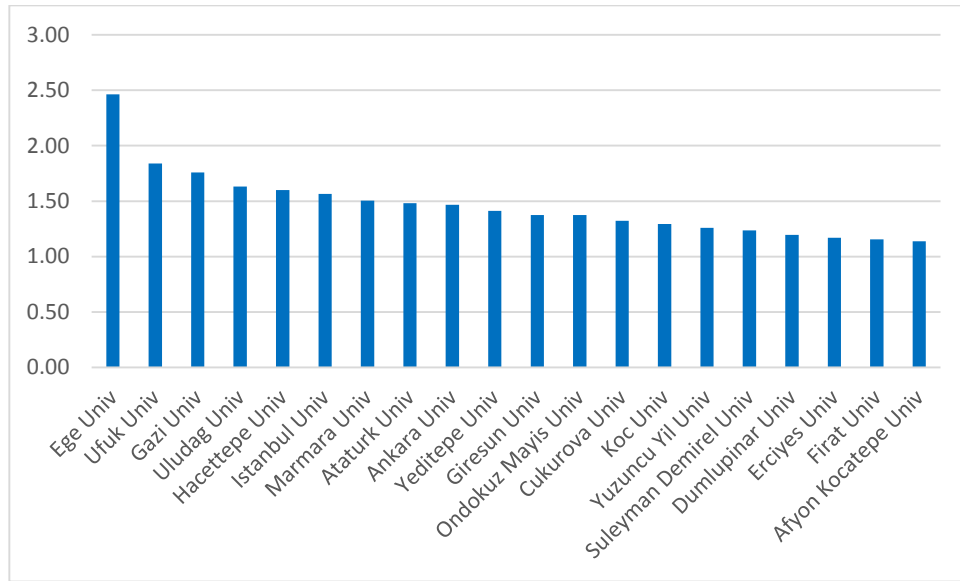


Figure 4.6. CPP values of the top 20 Turkish Universities.

According Figure 4.6 Ege, Ufuk, Gazi, Uludag, Hacettepe and Istanbul universities form the top five in terms of overall CPP values. However, none of the Turkish institutions exceed the world average CPP value of 3.20, which is computed over all 57 medical subjects in WoS via InCites. Figure 4.6. shows the CPP values of the most productive Turkish universities across the three main medical divisions. The full list of medical fields with their CPP are presented in Appendix C.

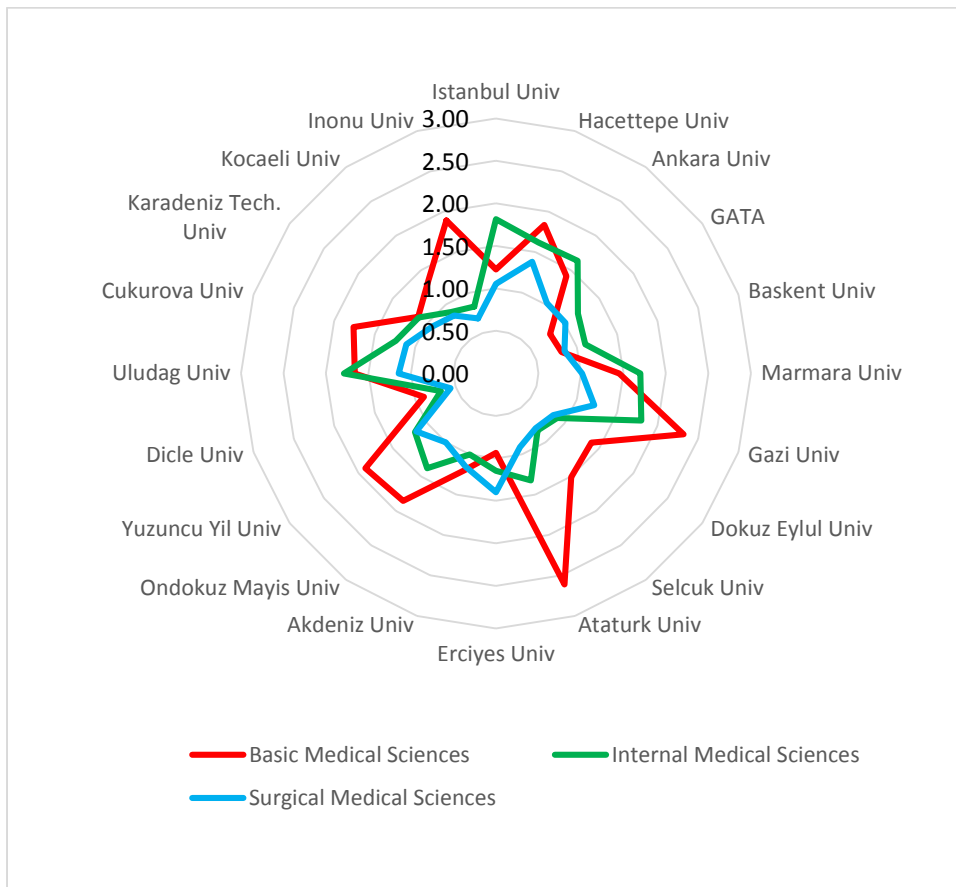


Figure 4.7. Distribution of citation per publication values for the Top 20 most productive Institutions in Turkey

As shown in Figure 4.7, on the contrary to the percentage distribution of publications and citations, none of the medical divisions stand out in general in terms of CPP values. Atatürk University (2.61) stands out among other institutions in terms of its high CPP value in basic medical sciences. Atatürk university is followed by Gazi University and Dicle University with CPP values of 2.32 and 1.90 respectively. In internal medical sciences, Istanbul (1.82), Gazi (1.80), Uludag (1.70), Marmara (1.70) and Ankara (1.64) universities form the top 5 based on their CPP values. Finally, Erciyes (1.40), Hacettepe (1.38), Gazi (1.21), Akdeniz (1.16) and Yuzuncu Yıl (1.16) universities form the top 5 in surgical sciences. Overall, Turkish universities have lower CPP values in surgical sciences as compared to the other two divisions.

The size of a university in terms of the number of faculty members and researchers affiliated with medical research is another important parameter for the evaluation of academic performance. The total number of publications and citations are influenced by the number of potential authors from an institution. According to data obtained from ÖSYM - Öğrenci Seçme ve Yerleştirme Kurumu (2012), the total number of faculty members in the 72 Turkish universities in our sample is 88057. Among these 88057 researchers, 27% (23952) of them are affiliated with the school of medicine. This number includes full, associate and assistant professors as well as instructors and research/teaching assistants, who are all assumed to be potential authors affiliated with the universities in our sample. Figure 4.7 shows the frequency distribution of faculty members in the top 20 most productive universities in our sample.

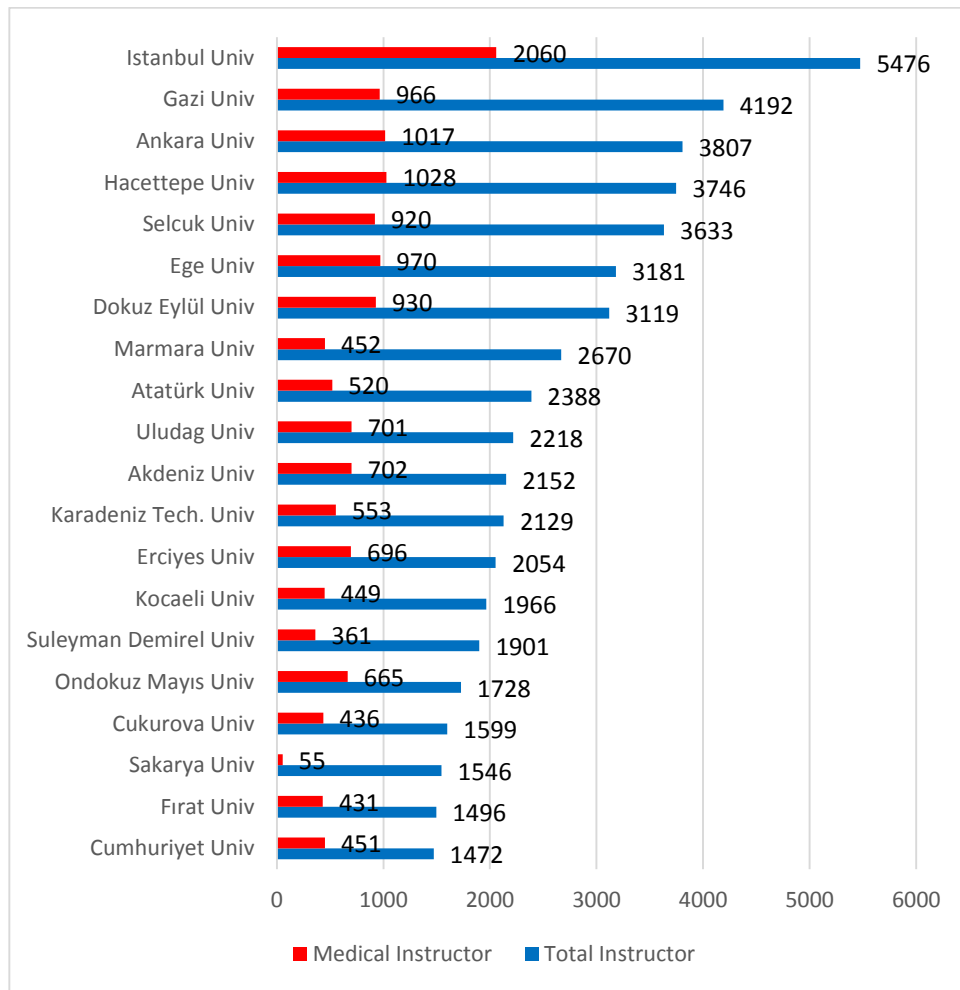


Figure 4.8. Total number of teaching and research staff in the top 20 most productive institutions.

As shown in Figure 4.8, Istanbul (2060), Hacettepe (1028), and Ankara (1017) universities have the most number of teaching/research staff affiliated with medicine. Istanbul University has two medical schools, namely Çapa and Cerrahpaşa, which makes this institution an outlier in terms of the number of affiliated staff. Other large institutions such as Hacettepe, Ankara, Gazi, Ege, Selcuk and Dokuz Eylül are similar in terms of size. Figure 4.9 shows the number of publications and citations per potential author for the duration 2010-2012.

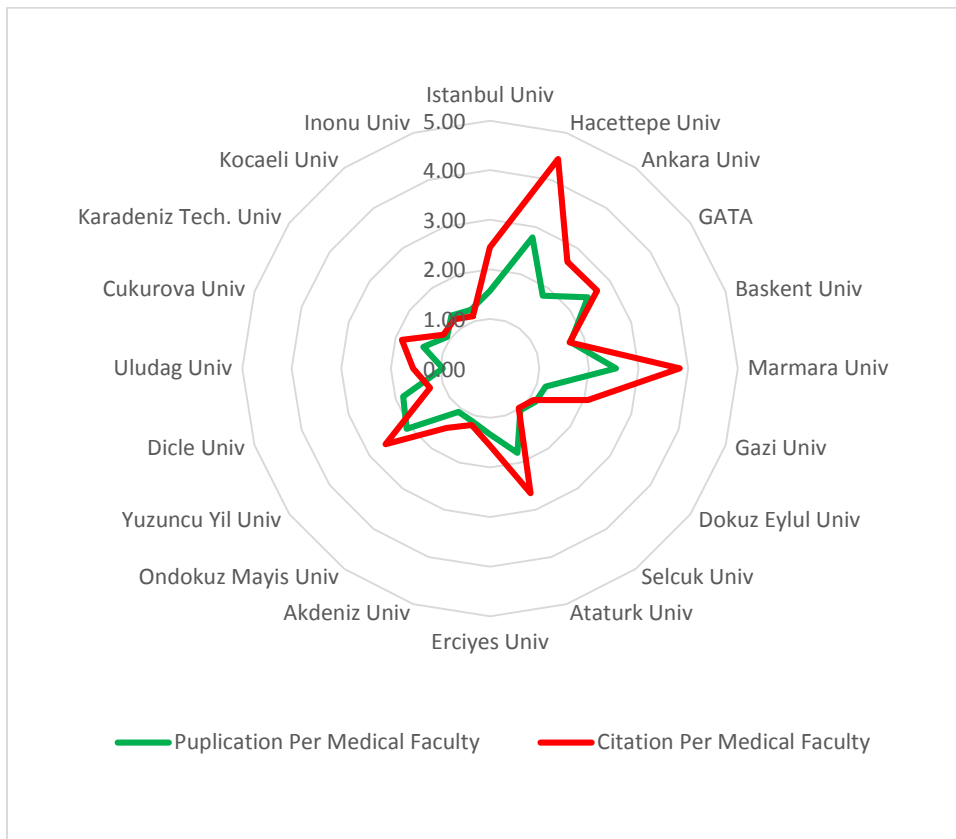


Figure 4.9. Distribution of publication (PPF) and citation (CPF) per medical faculty values for the Top 20 most productive Institutions in Turkey

The radar chart in Figure 4.9 suggests that Hacettepe (N=1028, PPF=2.78, CPF=2.44), Marmara (N=452, PPF=2.55, CPF=3.83), Ataturk (N=520, PPF=1.79, CPF=2.68), Yuzuncu Yil (N=336, PPF=2.07, CPF=2.61) and GATA (N=506, PPF=2.44, CPF=2.67) stand out among other top medical universities in terms of their productivity in 2010-2012. The comparison cannot be extended to global per capita measures, because such data is not available in bibliometric databases like WoS or InCites. Since raw measures such as the number of publications and citations are sensitive to the size of an institution, per capita measures such as the ones computed in this section are mainly used to control for size dependency. The full list of universities with their Instructor are presented in Appendix D

4.2. Analysis of Journals

This section focuses on the bibliometric profiles of medical journals in which articles affiliated with Turkish institutions frequently appeared during 2010-2012. A total number of 2122 journals that are indexed in WoS and have at least one article from a Turkish institution was generated as part of this analysis. Figure 4.10 summarizes the top 20 journals from this list, sorted by the frequency of articles authored by Turkish universities in each journal.

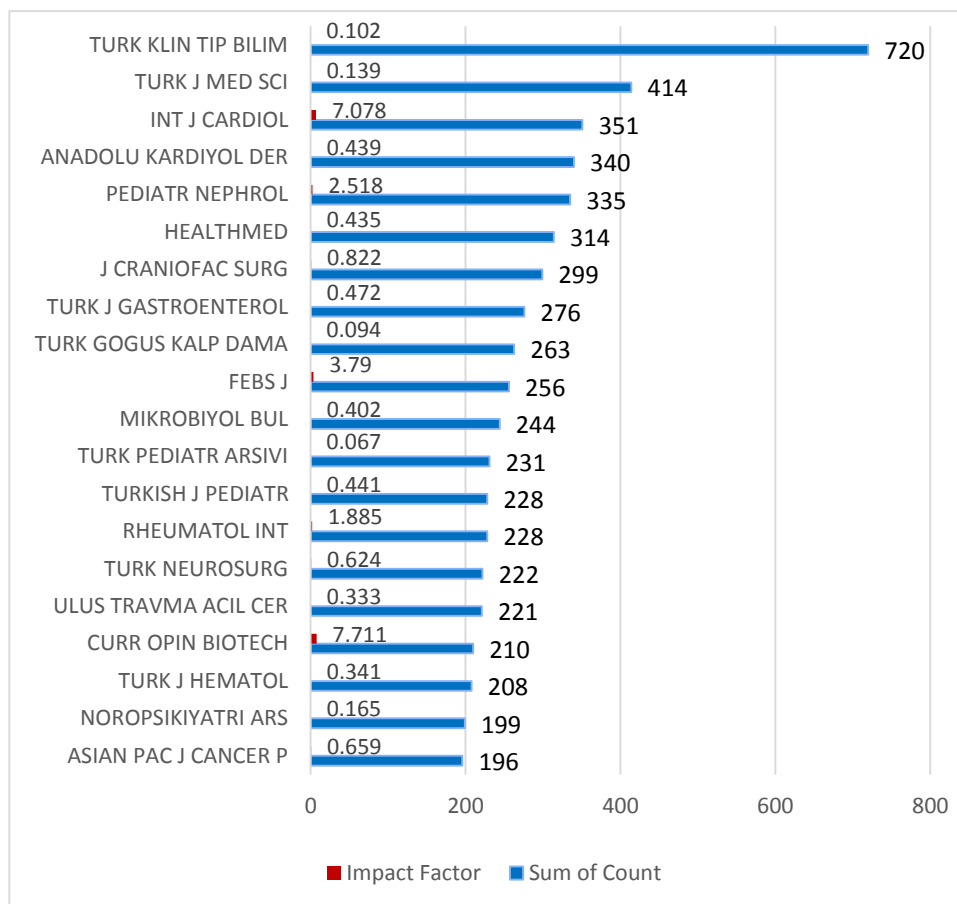


Figure 4.10. The abbreviated names and impact factors of journals that have the largest number of papers authored by a researcher affiliated with a Turkish university.

According to Figure 4.10, *Turkiye Klinikleri Tıp Bilimleri Dergisi* was the most popular journal with a total number of 720 articles from Turkish universities in 2010-2012. This is followed by the *Turkish Journal of Medical Sciences* and *International Journal of Cardiology*. Among the top 20 most popular journals, 12 of them are published in Turkey. The impact factors of these journals ranged between 0.067 and 7.711. When we consider the entire sample of journals where Turkish authors published their work in 2010-2012, the median impact factor value is 1.95.

According to the 2012 edition of Thomson Reuters' *Journal Citation Reports* (2012), the median impact factor value for the 3572 journals indexed under the medical subject categories considered in this study is 2.02. The percent of publications that were published in a journal with an impact factor lower than 2.02 constitutes % 62 of all the publications by Turkish institutions. Therefore, the majority of the articles are published in relatively lower impact journals.

Table 4.2. Number of publications of Turkish institutions in the top 20 journals

Abbreviated Journal Title	Count	2012 Impact Factor
New Engl J Med	22	53.298
Lancet	11	38.278
Nat Genet	26	35.532
Cell	3	32.403
Jama-J Am Med Assoc	2	30.026
Cancer Cell	1	26.566
Nat Immunol	2	26.008
Lancet Neurol	3	23.462
Lancet Oncol	4	22.589
Nat Med	1	22.462
Endocr Rev	16	19.929
J Clin Oncol	21	18.372
Ann Intern Med	1	16.733
Circulation	29	14.739
Nat Chem Biol	1	14.69
J Am Coll Cardiol	13	14.156
Dev Cell	1	14.03
J Exp Med	2	13.853
Genome Res	3	13.608
Am J Psychiat	1	12.539

Table 4.2 summarizes the total number of publications by the top 20 Turkish universities in medical journals that have the highest impact factor values. The table shows the top 20 journals, which are sorted by their 2012 impact factor values. The distribution in Table 4.2 suggest that Turkish institutions have also published several articles in high impact journals in medicine-related subject areas.

In Table 4.3, the lists of top 5 most frequently published journals are given for a particular Turkish university in the period 2010-2012.

Table 4.3. Top 5 most popular journals among the authors in top Turkish universities

Hacettepe Univ	Count	Impact Factor
Int J Cardiol	80	7.078
Turkish J Pediatr	78	0.441
J Inherit Metab Dis	61	3.577
Pediatr Nephrol	41	2.518
Turk Klin Tip Bilim	39	0.102
Istanbul Univ		
Turk Pediatr Arsivi	68	0.067
J Craniofac Surg	63	0.822
Turk Klin Tip Bilim	56	0.102
Clin Exp Rheumatol	48	2.148
Arthritis Rheum-Us	40	7.866
Ankara Univ		
Turk J Hematol	37	0.341
Febs J	31	3.79
Turk Klin Tip Bilim	30	0.102
Pediatr Nephrol	30	2.518
Turk J Gastroenterol	27	0.472
Gazi Univ		
Turk Klin Tip Bilim	31	0.102
Planta Med	19	2.153
Febs J	18	3.79
J Ethnopharmacol	16	3.014
J Inherit Metab Dis	15	3.577
Marmara Univ		
Febs J	20	3.79
Clin Exp Rheumatol	18	2.148
Arthritis Rheum-Us	16	7.866
Epilepsia	16	3.961
Int J Clin Pharm-Net	15	1.265

In table 4.3, the journals are sorted in terms of the number of publications they included from that university. The impact factors of each journal is also given. These tables indicate whether the authors from the institution tend to publish more frequently at high impact journals. The top 5 journals lists for all universities are presented in Appendix F.

We formed a composite score for each university by multiplying the number of publications with their corresponding journal impact factor for these top 5 lists. The resulting score highly correlated with the total number of citations received by an institution during 2010-2012, $r = .813$, $p < .001$. Figure 4.11 below shows the scatterplot obtained for the total citations and the composite score.

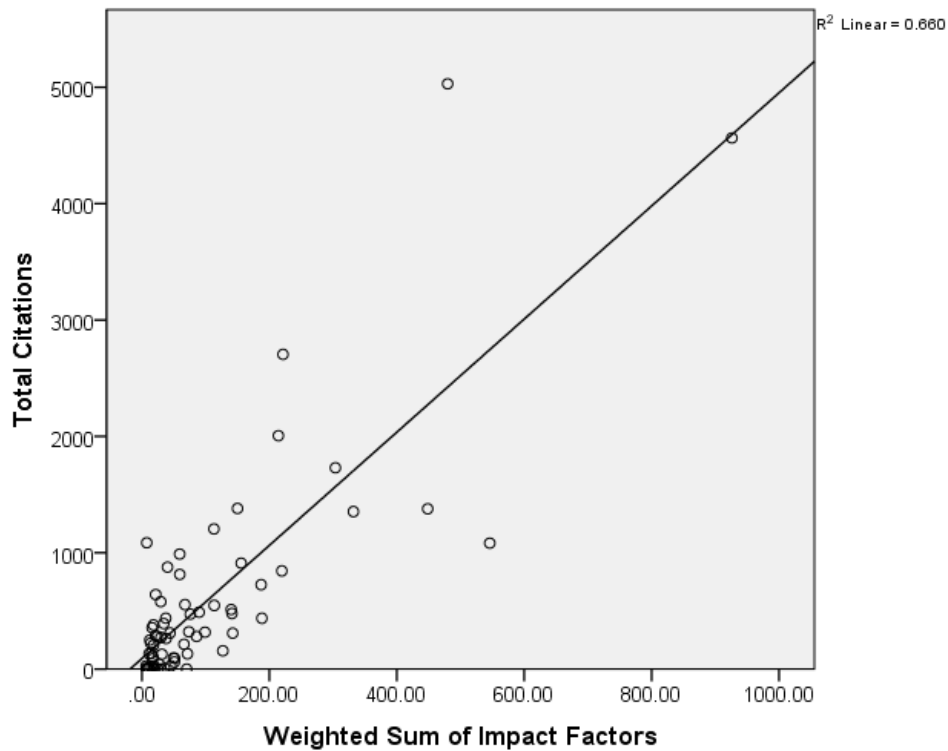


Figure 4.11. Scatterplot showing the linear relationships between total citations and the weighted sum of the number of articles in the top 5 journals according to their impact factors.

A linear regression analysis was conducted after a logarithmic transformation is applied to both variables. The transformation was necessary to satisfy the assumptions of regression for the distribution of error terms. When the logarithm of the composite score was considered as the predictor, it accounted for the 46% of the variability in citation scores. The regression analysis suggests that the composite score is a significant predictor of total citations, $\beta = 0.681$, $t(68) = 7.438$, $p < .001$ where a unit increase in the composite score amounts to an increase of 0.618 standard units in the total number of citations. Therefore, we argue that the top 5 lists given in appendix F can be useful in terms of estimating the impact generated by medical publications of a Turkish institution. Those institutions whose authors tend to aim for publishing their work in high impact journals tend to receive more citations. This is probably due to the fact that such journals have a larger audience, are more selective and tend to publish more articles, which increase the odds of receiving citations.

4.3. Collaborations with International Institutions

Publications of Turkish universities are also analyzed in terms of the presence of international co-authors. Such publications are assumed to be product of an international collaboration, which indicates how connected a Turkish institution is to the international research community in medicine. Figure 4.12 below shows the distribution of publications including at least one international co-author.

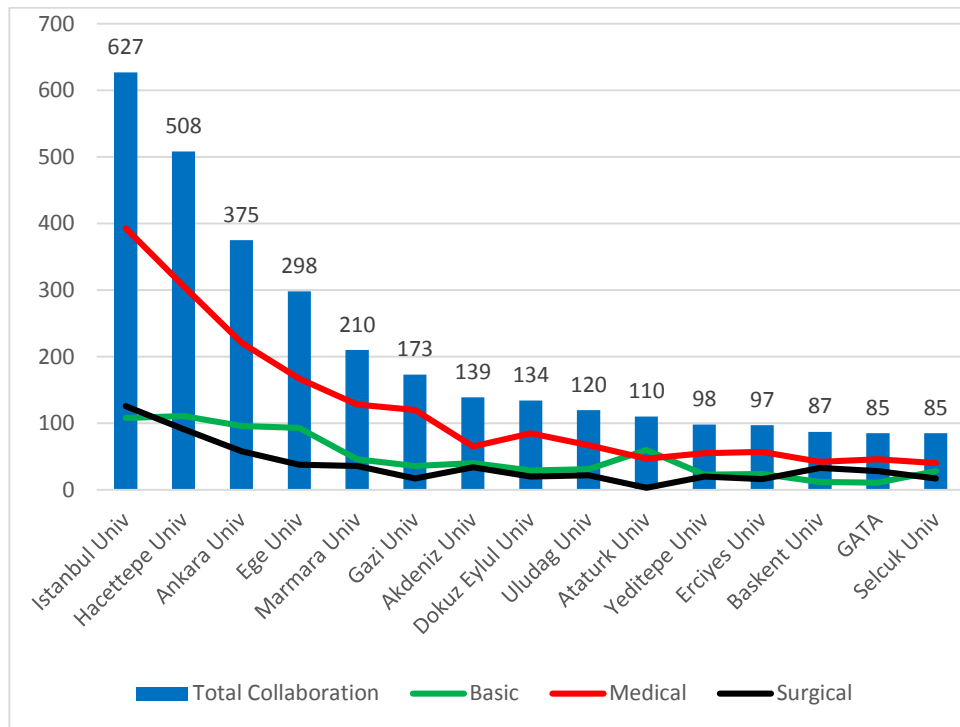


Figure 4.12. Top 15 Universities Publication Collaborations with foreign universities

Figure 4.12 indicates that Istanbul, Hacettepe, Ankara, Ege and Marmara universities produced the most internationally co-authored papers in Turkey. International collaboration more frequently occurred in the case of internal medical sciences. The number of internationally co-authored papers in surgical and basic sciences are much smaller in number in comparison to the medical sciences. Only 10 universities could publish more than 100 articles with co-authors from abroad.

The number of papers that were co-authored with international scholars might have a positive influence on the overall citations received by the institution. A correlation analysis was performed to test this relationship, which showed that there is a strong positive relationship between the number of internationally co-authored papers and the cumulative number of citations received, $r=.966$, $p<.001$. Figure 5.14 shows the scatterplot between these two variables.

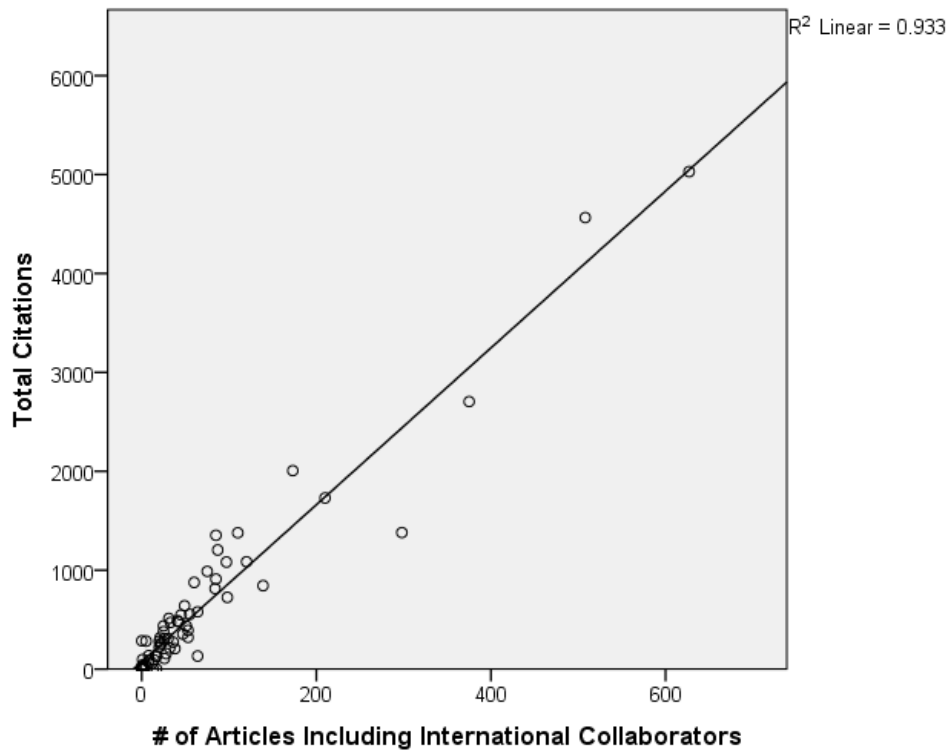


Figure 4.13. Scatterplot showing the linear relationships between total citations and the number of internationally co-authored papers.

A linear regression analysis was conducted after a logarithmic transformation is applied to both variables. The transformation was necessary to satisfy the assumptions of regression for the distribution of error terms. When the logarithm of the number of articles including international collaborators was considered as the predictor, it accounted for the 78% of the variability in citation scores. The regression analysis suggests that the logarithm of international papers is a significant predictor of total citations, $\beta = 0.884$, $t(57) = 14.166$, $p < .001$ where a unit increase in the logarithm of the number of international papers amounts to an increase of 0.884 standard units in the log of total number of citations. This suggests that the more publications with international collaborators a Turkish institute has, the higher their cumulative citation score.

4.4. Subject Based Analysis

In this section we focus on the academic performance at the level of medical subjects. Subject areas are selected among the categories provided by Web of Science. These categories were grouped under three general divisions reflecting the organizational structure of medical schools in Turkey. The following subsections zoom into each division to summarize the performance of Turkish institutions in specific subject fields with respect to World averages.

4.4.1. Basic Medical Sciences

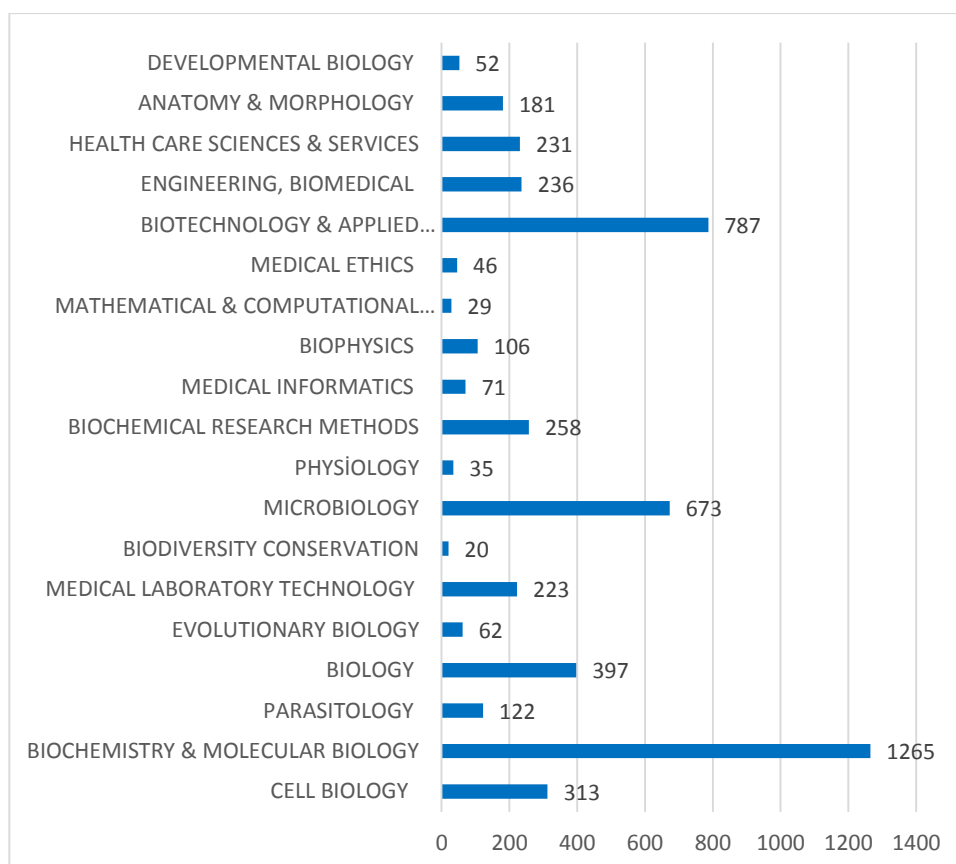


Figure 4.14 Distribution of Publications in Basic Medical Sciences

Figure 4.14 shows the distribution of publications among the 19 web of science categories that were combined together to form the division of basic medical sciences. Microbiology, Biochemistry & Molecular Biology, Biology, Biotechnology & Applied Microbiology and Cell Biology stand out among other basic medical science subjects in terms of their publication frequency. Each university's contribution to these subject areas are summarized in a separate table presented in Appendix G.

Figure 4.15 compares the distributions of publications in these subject areas to the total number of publications in the world. According to the figure 4.16, the distribution of Microbiology, Biochemistry & Molecular Biology, Biology, Biotechnology & Applied Microbiology and Cell Biology in Turkey are similar to the World distribution. The main difference seems to be the stronger presence of cell biology publications in the world.

Figure 4.16 provides a similar comparison among the two top Turkish universities with the highest number of publications in basic medicine, namely Istanbul and Hacettepe Universities. The radar charts of both institutions are again similar to each other, indicating the dominance of Biochemistry & Molecular Biology, Biotechnology & Applied Microbiology and Microbiology subject areas within the basic medical sciences division. The only difference is that, medical laboratory technology papers have a larger total count in Istanbul University, which is replaced by Biology in Hacettepe.

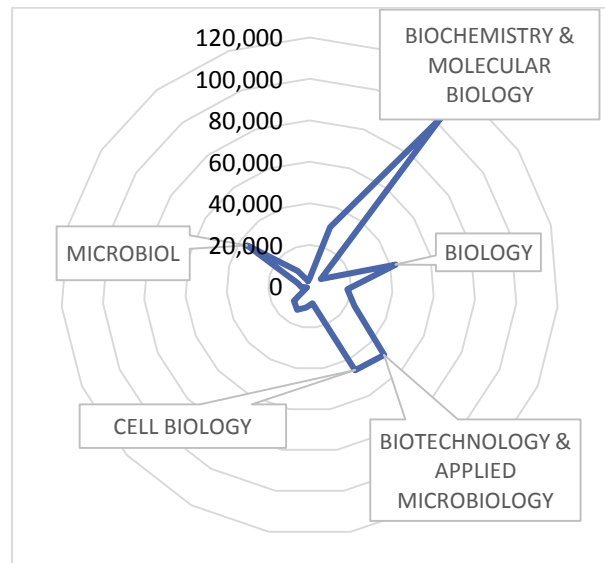
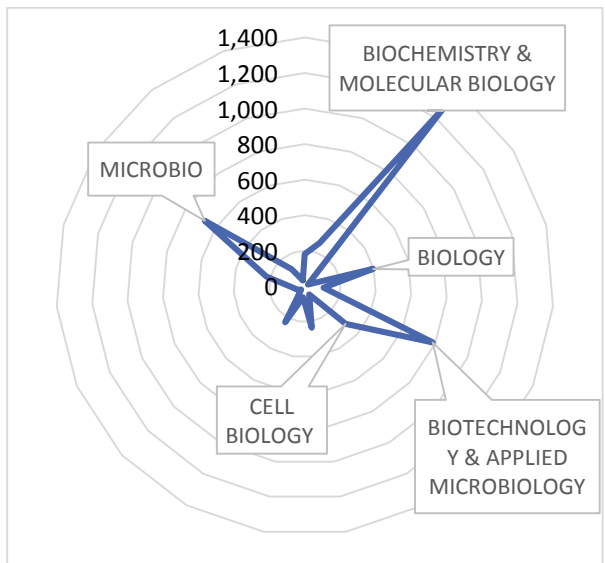


Figure 4.15 Comparison of Basic Medical Sciences Publications between Turkey (left) and the World (right) in terms of top 5 subject areas

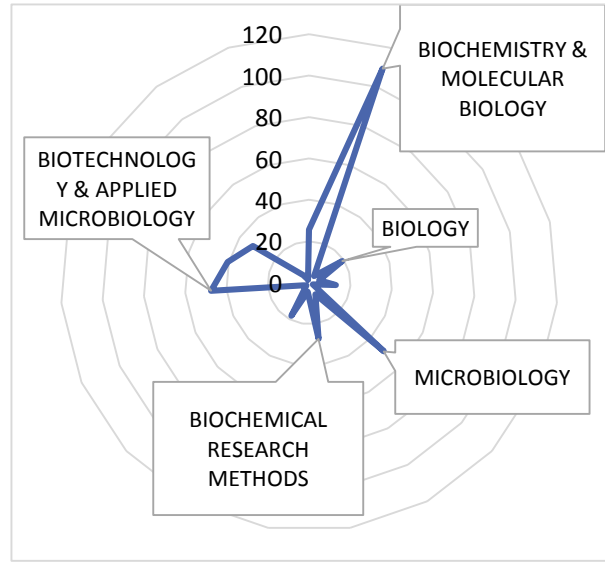
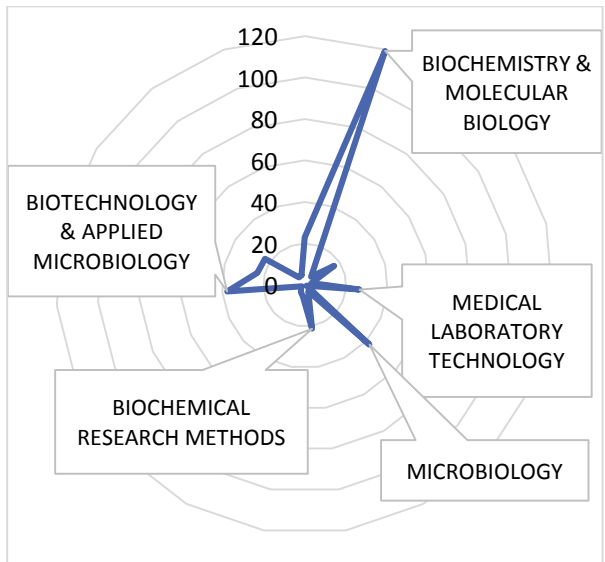


Figure 4.16 Comparison of Basic Sciences publications between Istanbul University (left) and Hacettepe University (right) in terms of top 5 subject areas

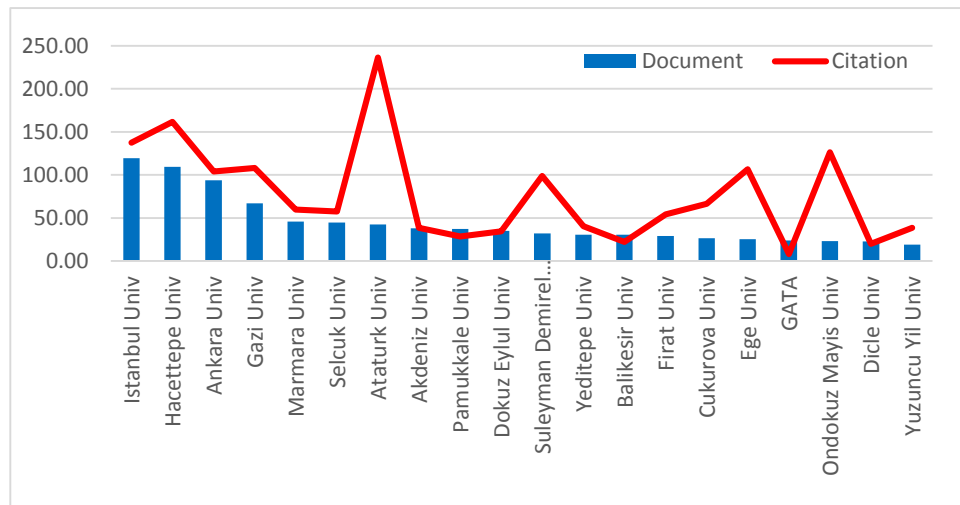


Figure 4.17. Biochemistry & Molecular Biology Citation and Document Frequency Distribution

As shown in Figure 4.17, the highest number of publications appeared in the subject area called Biochemistry & Molecular Biology, among all the subject areas grouped under the basic medical sciences division in Turkey. Figure 4.17 shows the distribution of these publications over specific institutions. Istanbul University leads other universities in terms of the number of publications, followed by other large medical schools Hacettepe and Ankara. However, Ataturk, Ondokuz Mayıs, Ege and Suleyman Demirel universities stand out with high number of citations relative to their publications. These institutions outperform most universities in Turkey in terms of their citation per publication, which suggest that these universities publish high impact work in this field.

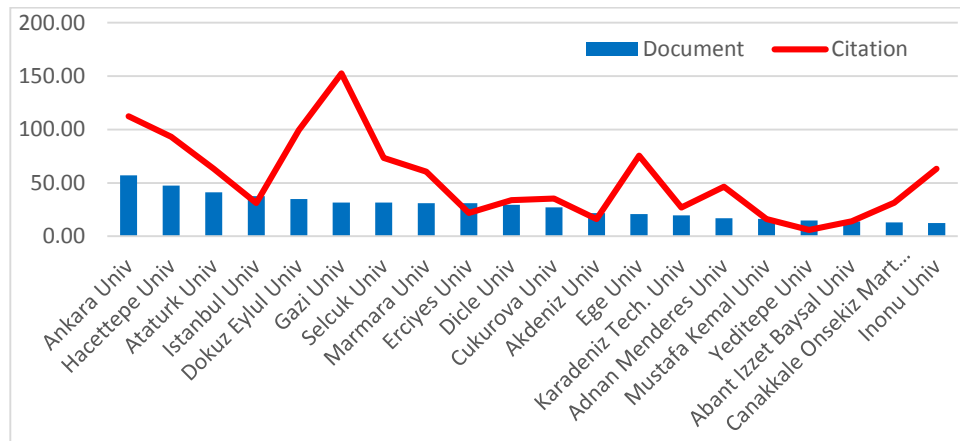


Figure 4.18. Biotechnology & Applied Microbiology Citation and Document Frequency Distribution

Figure 4.18. shows the distribution of publications and citations among Turkish universities in the subject area of Biotechnology and Applied Microbiology. In terms of publication output, Ankara, Hacettepe and Ataturk universities forms the top three. In terms of impact per publication, Gazi and Ege universities stand out with their high CPP values.

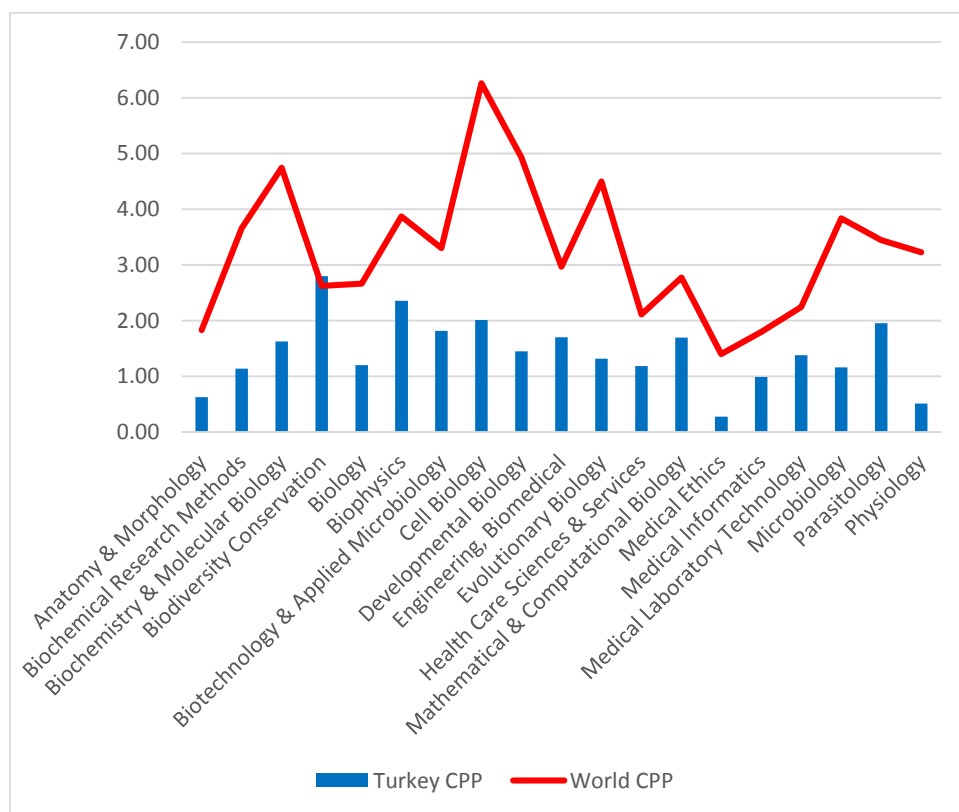


Figure 4.19. Comparison of World and Turkey CPP values in subject areas grouped under basic medicine

Figure 4.19 compares the CPP values for Turkish universities to World CPPs across the 14 subject areas related to basic medicine. World CPP values for the duration 2010-2012 were extracted from InCites, which is a subscription based citation analytics interface working over the Web of Science database. World CPP values show the average number of citations a paper published in a specific subject area has received during 2010-2012. With the exception of Biodiversity Conservation, Turkish institutions are below the world average in terms of CPP values. Despite the high frequency of publications in Biochemistry & Molecular Biology, Biotechnology & Applied Microbiology and Microbiology, the CPP values are almost the half of the world average for all three subjects.

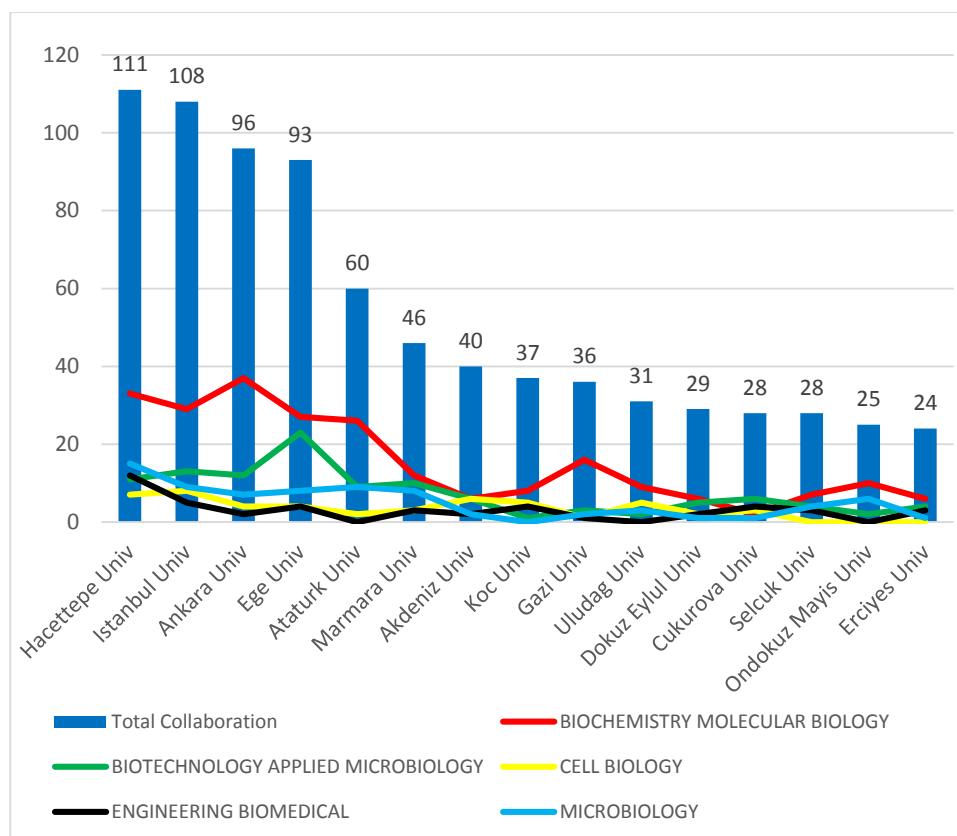


Figure 4.20. Number of Publications Including International Collaborators in Basic Medical Sciences

Figure 4.20 shows the distribution of publications that include at least one international co-author in subjects grouped under the basic medical sciences division. Hacettepe, Istanbul, Ankara and Ege universities stand out among others in terms of the total number of their internationally co-authored publications. The line graphs indicate collaboration patterns for specific subject areas. According to Figure 4.20 Turkish institutions produced the most number of publications in Biochemistry and Biotechnology with international collaborators.

4.4.2. Internal Medical Sciences

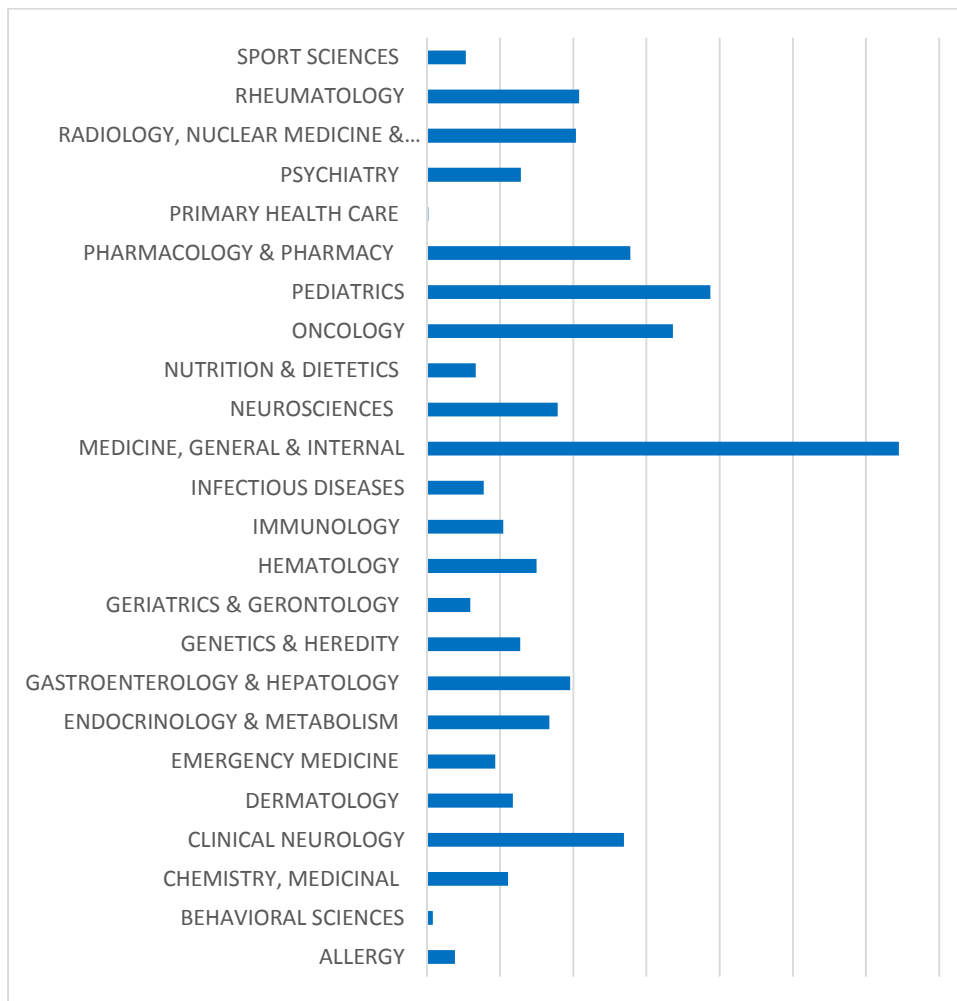


Figure 4.21. Distribution of Publications in Internal Medical Sciences

Figure 4.21 shows the distribution of publications among the 24 Web of Science categories that were combined together to form the division of internal medical sciences. General & Internal Medicine, Pediatrics, Oncology, Pharmacology and Clinical Neurology stand out among other basic medical science subjects in terms of their publication frequency. Each university's contribution to these subject areas are summarized in a separate table presented in Appendix H.

Figure 4.22 compares the distributions of publications in the internal medicine related subject areas to the total number of publications in the world. The radar chart highlights only the subject areas that have the largest number of publications. Neurosciences have the largest share in the world, followed by Pharmacology, Clinical Neurology and Oncology. Except Neurosciences, these subjects are also strongly represented in the Turkish publications. Subject areas such as Pediatrics and Rheumatology stand out among other subject areas in the Turkish case. These subjects do not have a similar position in the case of the world.

Figure 4.23 provides a similar comparison among the two top Turkish universities with the highest number of publications in the internal medicine division, namely Istanbul and Hacettepe Universities. The radar charts of both institutions are again similar to each other, indicating the dominance of Pediatrics, Oncology and Clinical Neurology.

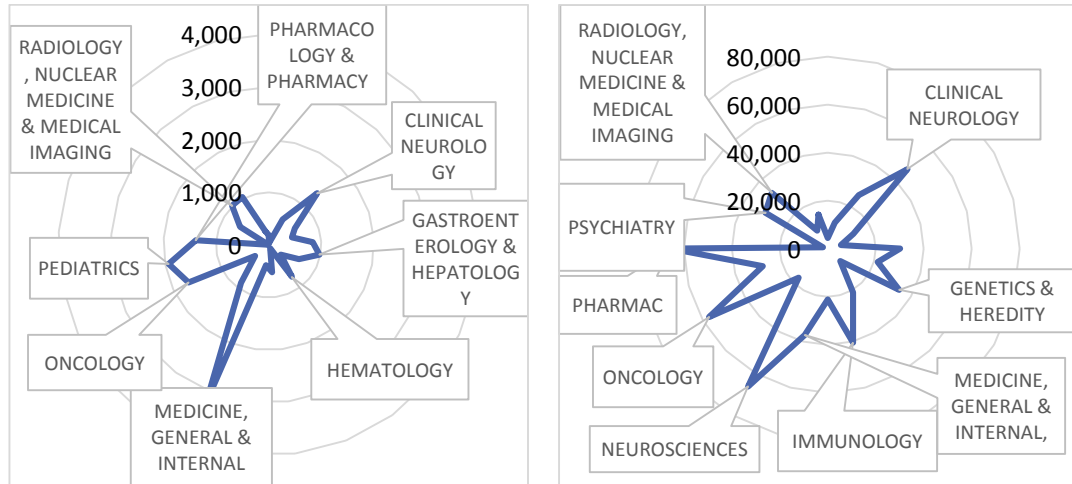


Figure 4.22. Comparison of Internal Medical Sciences between Turkey (left) and the World (right)

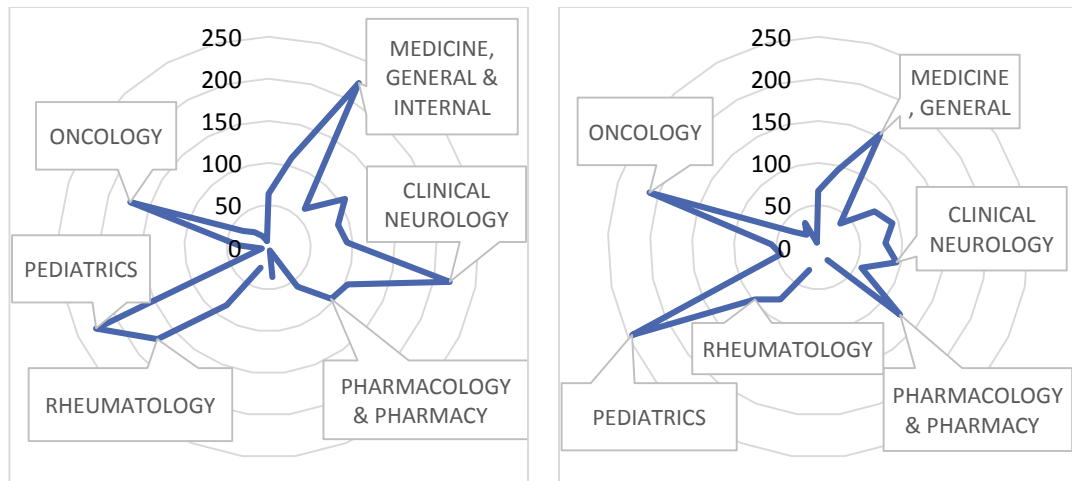


Figure 4.23. Comparison of Internal Medical Sciences between Istanbul University (left) and Hacettepe University (right)

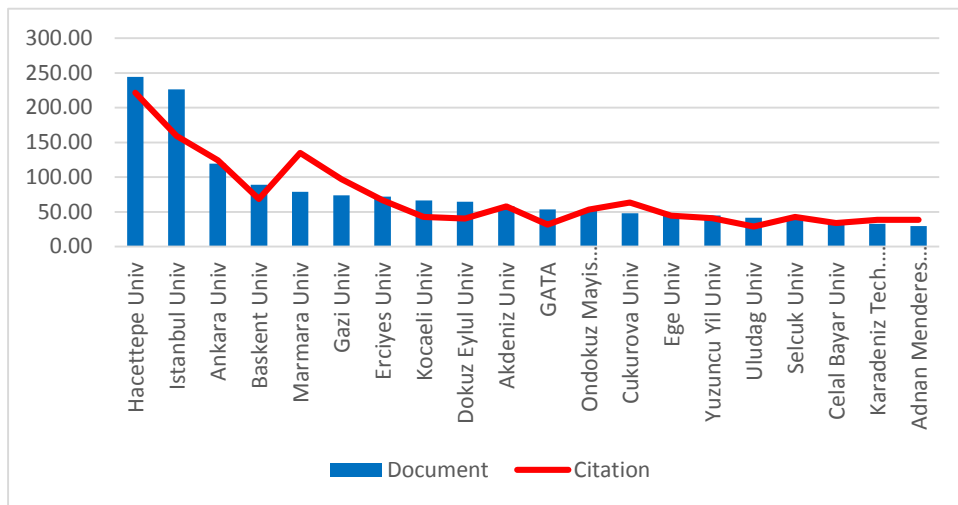


Figure 4.24 Citation and Document Frequency of Turkish Universities in Pediatrics

Figure 4.24 shows the distribution of publications over specific institutions in Pediatrics. Hacettepe University leads other universities in terms of the number of publications, followed by other large medical schools Istanbul and Ankara. However, Marmara and Gazi universities stand out with high number of citations relative to their publications. These institutions outperform most universities in Turkey in terms of their citation per publication, which suggest that these universities publish high impact work in this field. Despite its high number of publications in this field, Istanbul University underperforms in terms of citation counts.

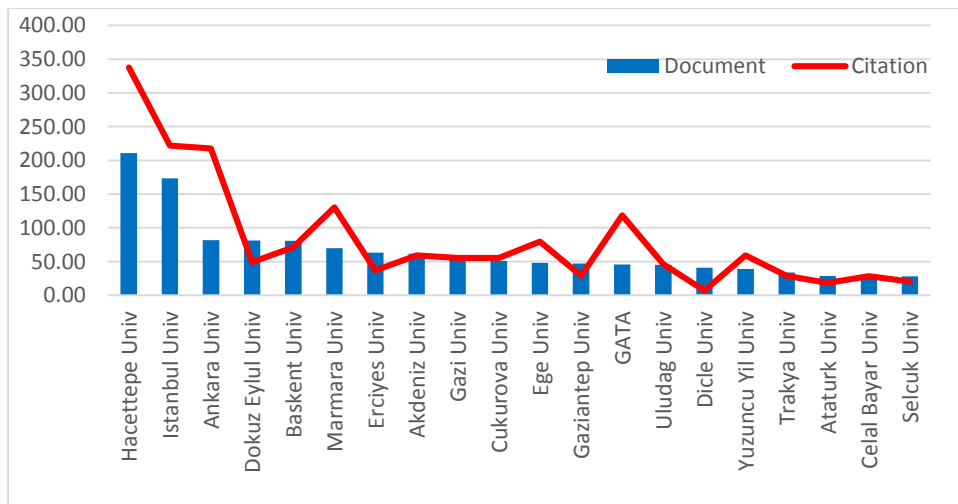


Figure 4.25. Oncology Citation and Document Frequency

Figure 4.25 shows the distribution of publications over specific institutions in Oncology, which is another popular subject area for Turkish institutions. Hacettepe University again leads other universities in terms of the number of publications, followed by Istanbul and Ankara. In terms of citation per publication, Ankara, Marmara and GATA stand out among other institutions.

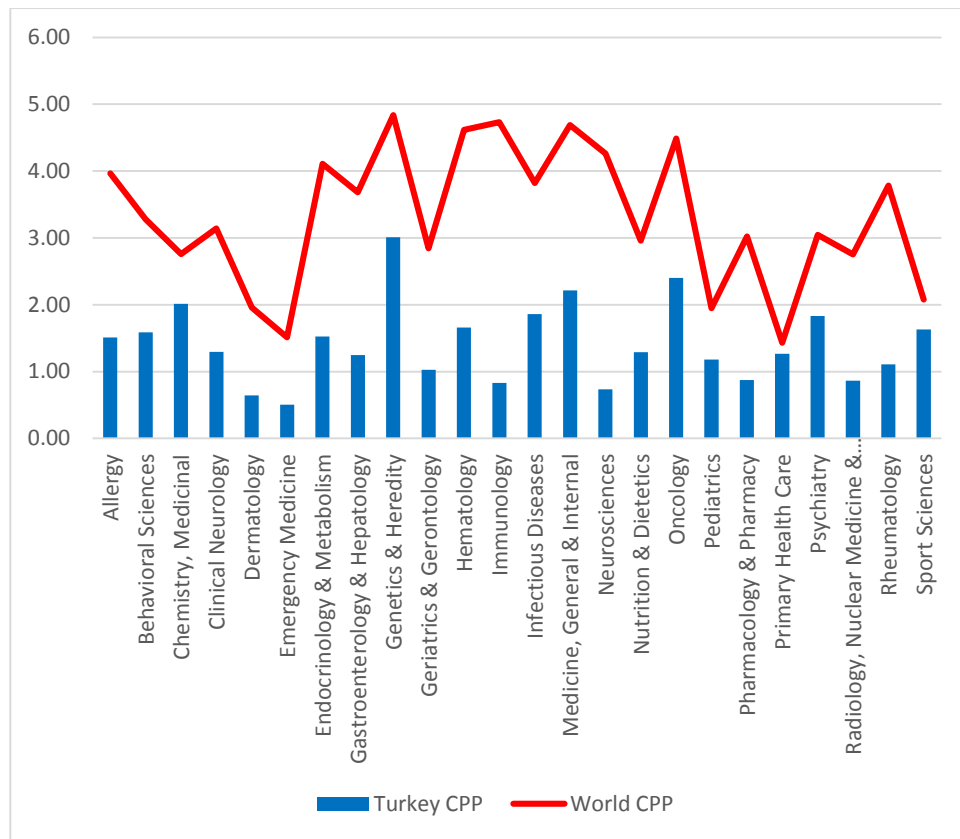


Figure 4.26. Comparison of World and Turkey CPP values in subject areas grouped under internal medicine

Figure 4.26 compares the CPP values for Turkish universities to World CPPs obtained from InCites across the 24 subject areas related to internal medicine. Overall Turkish institutions cannot outperform the world average in any one of the subject areas related to internal medicine. CPP values for the subjects Primary Health Care and Sports Sciences are closest to the world averages. Turkish institutions particularly underperform in Neurosciences, which is an increasingly growing field in the world. Turkish institutions have the highest CPP values in fields such as Genetics and Oncology, but the CPP values are lower than the world average in both cases.

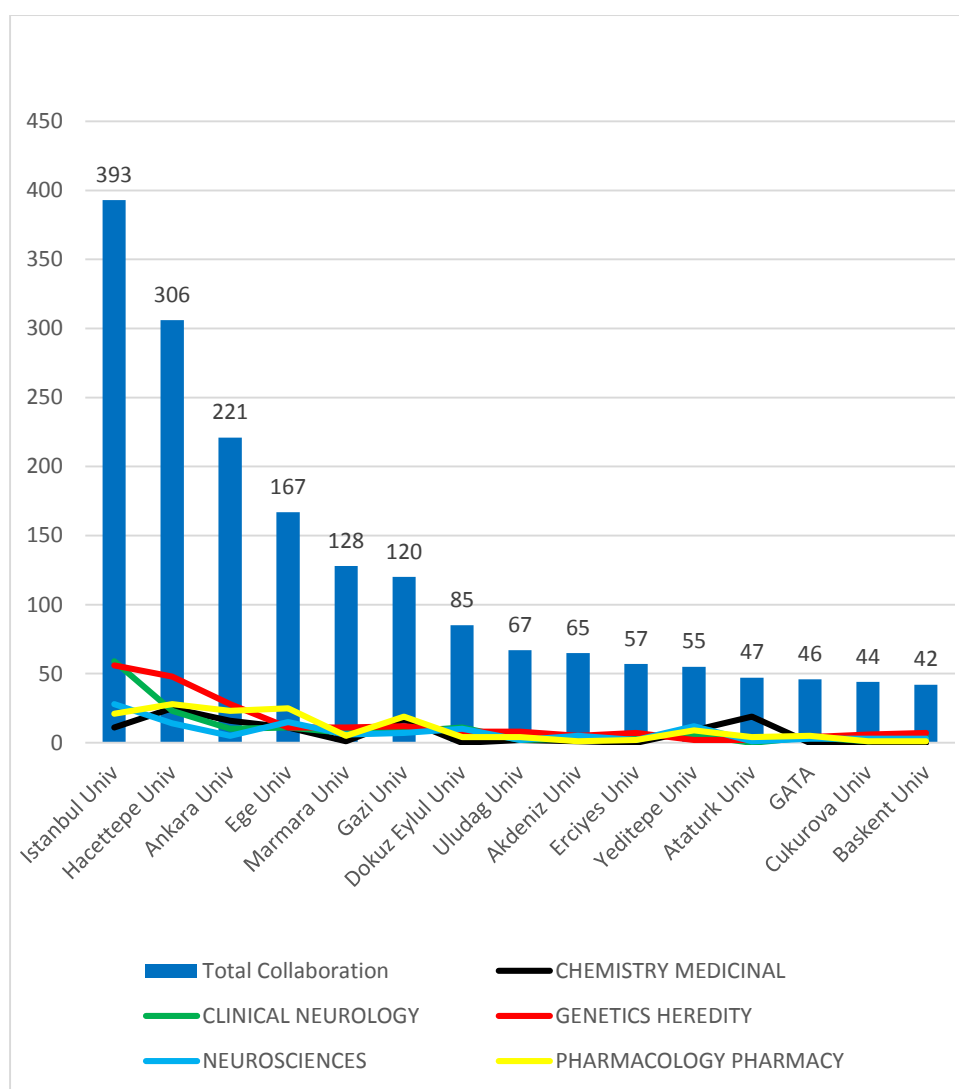


Figure 4.27. International Collaboration in Subjects Related to Internal Medical Sciences

Figure 4.27 shows the distribution of publications that include at least one international co-author in subjects grouped under the internal medical sciences division. Istanbul, Hacettepe, Ankara and Ege universities stand out among others in terms of the total number of their internationally co-authored publications. The line graphs indicate collaboration patterns for specific subject areas. According to Figure 4.27 Turkish institutions produced the most number of publications in Genetics and Clinical Neurology with international collaborators.

4.4.3. Surgical Medical Sciences

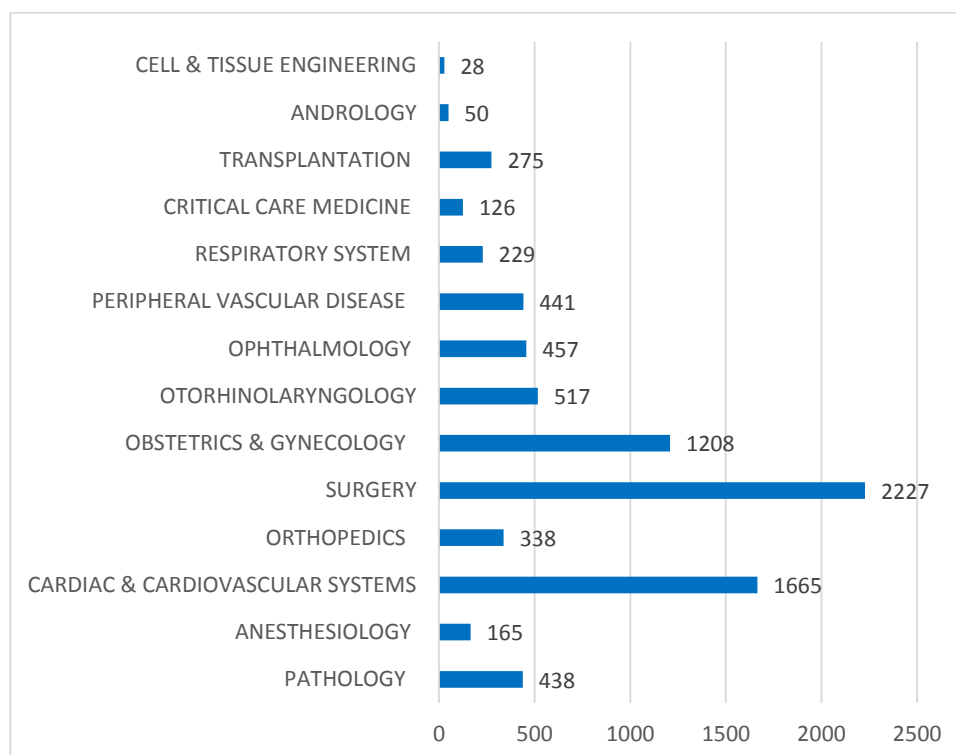


Figure 4.28. Distribution of Publications in Surgical Medical Sciences

Figure 4.28 shows the distribution of publications among the 14 Web of Science categories that were combined together to form the division of surgical medical sciences. Surgery, Peripheral Vascular Disease, Obstetrics & Gynecology, and Cardiac & Cardiovascular Systems stand out among other surgical medical science subjects in terms of their publication frequency. Each university's contribution to these subject areas are summarized in a separate table presented in Appendix I.

Figure 4.29 compares the distributions of publications in the surgical medicine related subject areas to the total number of publications in the world. The radar chart highlights only the subject areas that have the largest number of publications. Surgery, Cardiac & Cardiovascular Systems, Obstetrics & Gynecology are the most frequently published subject areas in both Turkey and in the World. A main difference seems to be due to frequency of publications in Orthopedics, which are not equally represented in the Turkish sample. Figure 4.30 compares the top two Turkish universities in terms of their publication distribution in surgical sciences, which are almost identical to each other.

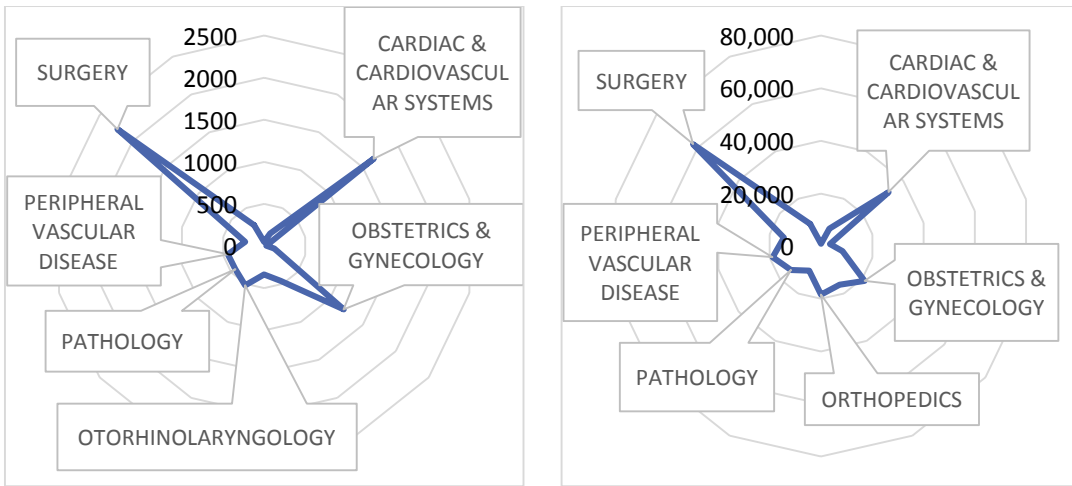


Figure 4.29. Comparison of Surgical Medical Sciences between Turkey (left) and the world (right)

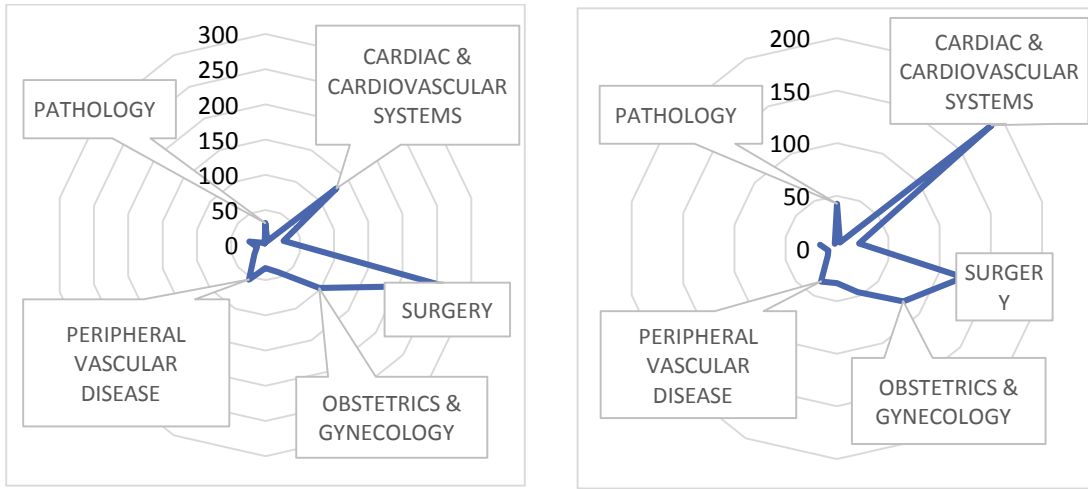


Figure 4.30. Comparison of Surgical Medical Sciences Publication between Istanbul University(left) and Hacettepe University(right)

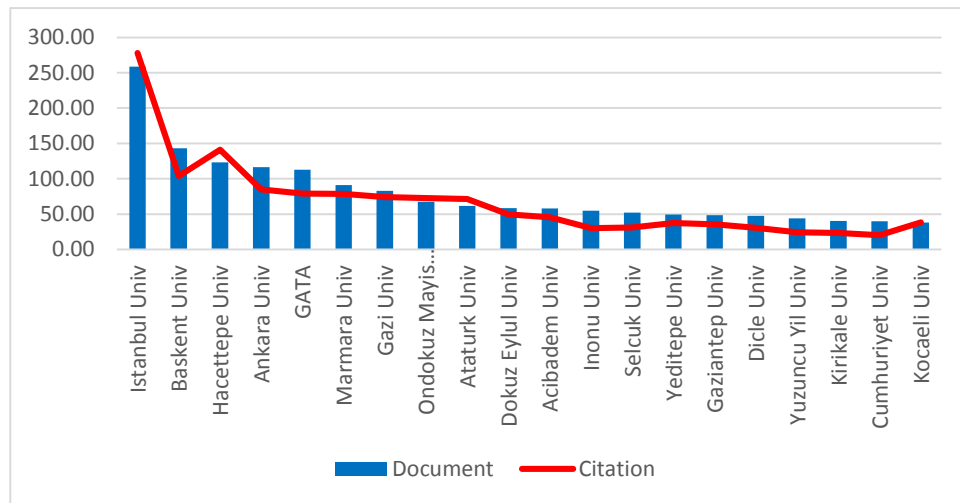


Figure 4.31 Surgery Document and Citation Frequency

Figure 4.31 shows the distribution of publications and citations of top 20 Turkish institutions in the subject area of Surgery. Istanbul, Baskent, Hacettepe, Ankara and GATA take the first five spots in terms of publication frequency. However, the number of citations to Surgery publications tend to be lower than the number of publications, which suggests that Surgery publications in Turkey have relatively lower impact as compared to other subject areas.

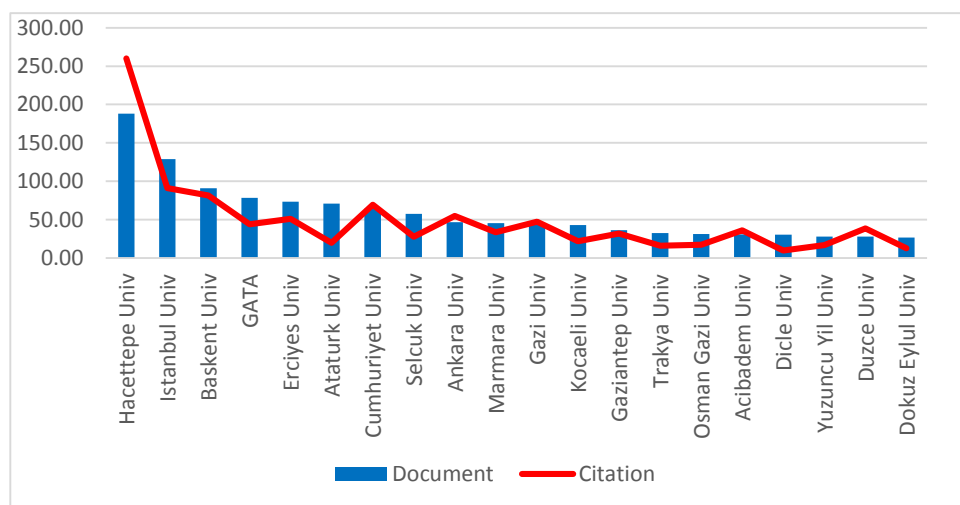


Figure 4.32 Cardiac & Cardiovascular Systems Publication and Citation Frequency

Figure 4.32 shows the citation and publication distribution in another important surgical medicine subject, namely Cardiac & Cardiovascular Systems. Hacettepe, Istanbul, Baskent, GATA and Erciyes have published the highest number of articles in this subject. However, except Hacettepe University, all Turkish institutions tend to score lower on citation counts, which also indicate that papers published in this subject have relatively low impact.

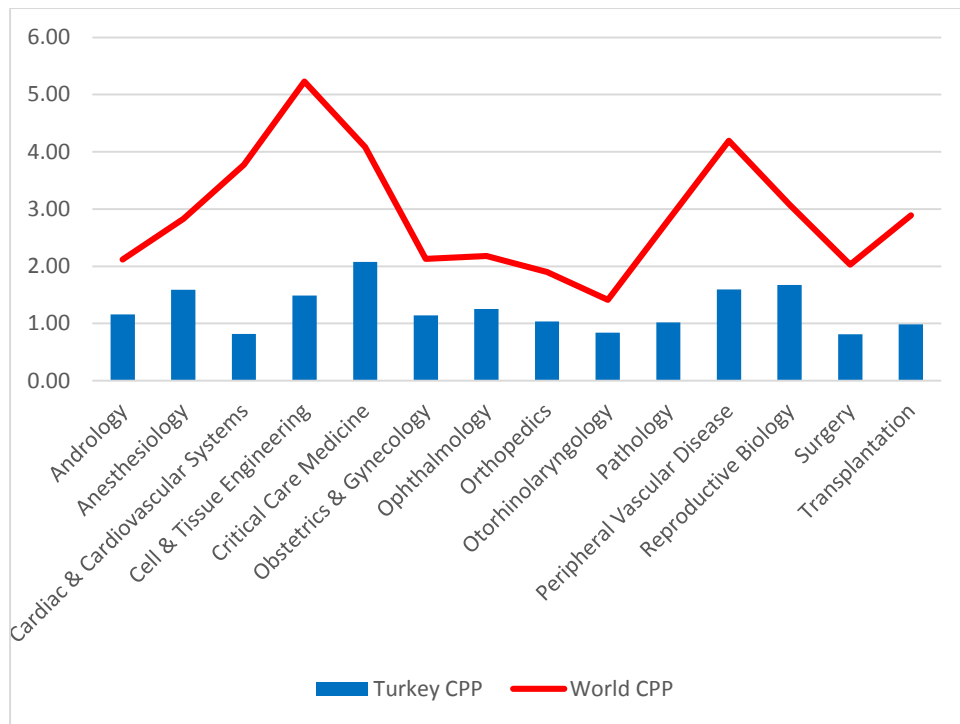


Figure 4.33 Surgical Medical Science Divisions (Impact Relative to Subject Area)

Figure 4.33 compares the CPP values for Turkish universities to World CPPs obtained from InCites across the 14 subject areas related to surgical medicine. Similar to the case of internal medicine, Turkish institutions cannot exceed the world average in any one of the subject areas related to surgical medicine. The gap between world CPP and national CPP seems to be the smallest in subject areas such as Andrology and Otorhinolaryngology. However, there is a large gap between key subject areas such as Surgery, Cardiac & Cardiovascular Systems and Cell & Tissue Engineering, which was also hinted by the low citation counts observed in Figures 4.31 and 4.32.

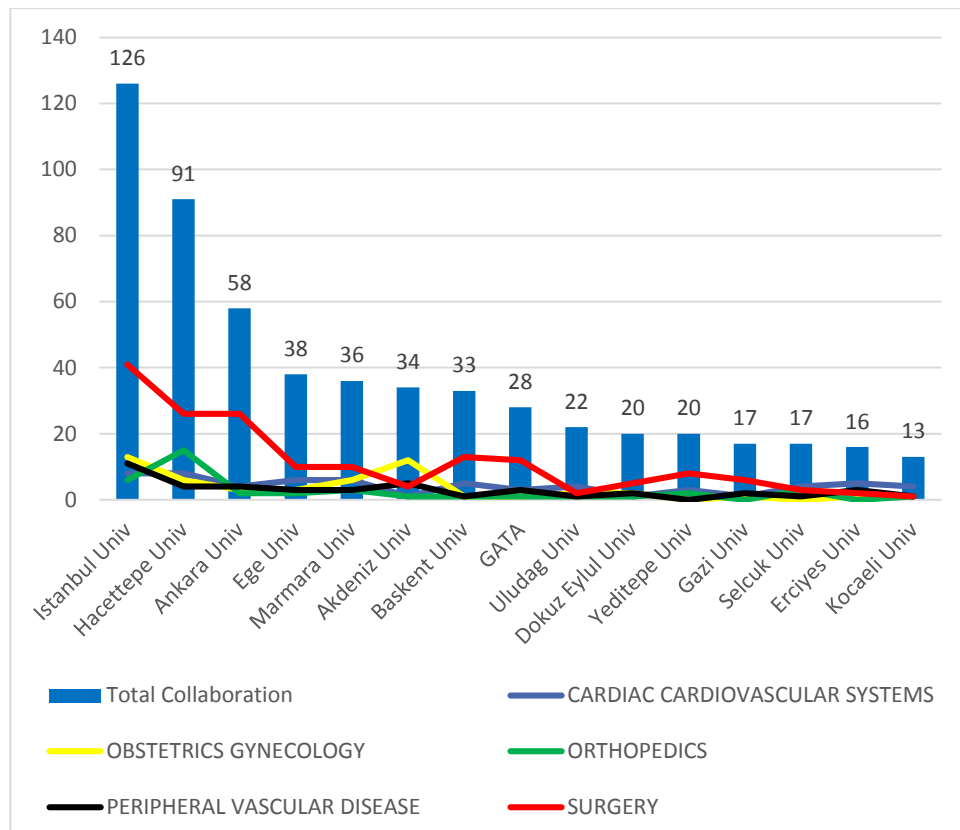


Figure 4.34 Surgical Medical Science Collaborations

Figure 4.34 shows the distribution of publications that include at least one international co-author in subjects grouped under the surgical medical sciences division. Istanbul, Hacettepe, Ankara and Ege universities stand out among others in terms of the total number of their internationally co-authored publications in this medical division as well. The line graphs indicate collaboration patterns for specific subject areas. According to Figure 4.34 Turkish institutions produced the most number of publications in Surgery with international collaborators.

CHAPTER 5

RESULTS AND DISCUSSION

In this section the main findings of the study will be discussed in reference to the main research questions. This thesis study aimed to provide a general bibliometric profile of Turkish universities in the field of medicine and life sciences. For that purpose a bibliometric analysis of publications in related subject areas was conducted, which were contributed by 72 Turkish universities that have a school of medicine. The scope of the analysis was limited to the most recent 3 years in an effort to identify the current trends in Turkey. The Web of Science database was used as the main bibliometric data source.

5.1. General Bibliometric Trends in Medical Publications in Turkey

Our first research question was concerned with comparing Turkish institutions in terms of their overall bibliometric profiles in medical sciences. The results indicated that Turkish institutions collectively produced 33,575 documents. 24,852 of these documents were journal articles published in a scholarly journal indexed by WoS. These articles were cited for 40,946 times in the WoS database during 2010 and 2012.

Next, the distribution of these bibliometric measures were analyzed for each Turkish institution. The results suggested that Istanbul (3126), Hacettepe (2855), Ankara (1844), GATA (1234) and Baskent (1223) formed the top five in terms of their total publication count. The results also indicated that Istanbul University (5029) has the highest total number of citations among all universities. Hacettepe, Ankara, Gazi and Marmara universities followed Istanbul University with 4564, 2704, 2006 and 1706 total citations respectively. In addition to this, citations per publication (CPP) values were generated from these values to compare Turkish universities in terms of their efficiency for generating high impact work. According to CPP values, Ege (2.46), Ufuk (1.84), Gazi (1.76), Uludag (1.63) and Hacettepe (1.60) ranks in the top 5. However, all Turkish universities are below the World CPP value (3.20) for the 57 medical subject areas considered in this study.

Finally, Turkish institutions are compared with respect to their publications and citations per number of medical faculty members in that institution. The employment data was based on OSYM statistics with the assumption that these values will provide a rough approximation of potential authors at Turkish institutions that will remain fairly constant in the course of 3 years. As evidenced in OSYM statistics, Turkish institutions vary greatly in terms of size (i.e. number of potential authors), where Istanbul (2060), Hacettepe (1028), and Ankara (1017) universities have the most number of teaching/research staff affiliated with medicine. When the raw bibliometric measures were normalized with respect to size, Hacettepe (N=1028, PPF=2.78, CPF=2.44), Marmara (N=452, PPF=2.55, CPF=3.83), Ataturk (N=520, PPF=1.79, CPF=2.68), Yuzuncu Yil (N=336, PPF=2.07, CPF=2.61) and GATA (N=506, PPF=2.44, CPF=2.67) were the top medical universities in terms of their productivity in 2010-2012.

5.2. Comparisons Among Turkish Universities Across Medical Divisions

Our second research question is concerned with comparing Turkish universities in terms of their bibliometric profiles in the three medical divisions, namely basic sciences, surgical sciences and internal medicine. The three divisions reflect the departmental organization of school of medicine in Turkey. 57 subject areas in the WoS database were mapped into department names to form the three medical divisions. As a result, 20, 23 and 14 WoS subject areas are assigned to Basic Medical Sciences, Internal Medical Sciences, and Surgical Medical Sciences divisions respectively.

The three divisions were compared in terms of the percentage of publications and citations they include at each institution. The results suggested that internal medical sciences at each of these universities had the highest percentage among the three divisions of medical sciences. Surgical sciences ranked second for the majority of top publishing Turkish universities. Baskent, Inonu and Istanbul universities were noticeable among other Turkish universities in terms of their percentage of publications in surgical medical sciences. Overall Turkish universities tend to publish less in basic medical sciences.

As far as the distribution of citations are concerned, the highest percentage of citations were again received in the internal medical sciences for all Turkish universities in the top 20. Surgical sciences ranks second for the majority of Turkish universities. Baskent, Inonu and Istanbul universities differentiated themselves among other Turkish universities in terms of the percentage of citations they received in surgical sciences. In some universities such as Atatürk, Selçuk, Dokuz Eylül, Gazi, Marmara and Cukurova, basic medical sciences ranked second in terms of the percentage of citations.

On the contrary to the percentage distribution of publications and citations, none of the medical divisions stand out in general in terms of CPP values. Atatürk University (2.61) stands out among other institutions in terms of its high CPP value in basic medical sciences. Atatürk university is followed by Gazi University and Dicle University with CPP values of 2.32 and 1.90 respectively. In internal medical sciences, Istanbul (1.82), Gazi (1.80), Uludağ (1.70), Marmara (1.70) and Ankara (1.64) universities form the top 5 based on their CPP values. Finally, Erciyes (1.40), Hacettepe (1.38), Gazi (1.21), Akdeniz (1.16) and Yuzuncu Yıl (1.16) universities form the top 5 in surgical sciences. Overall, Turkish universities have lower CPP values in surgical sciences as compared to the other two divisions.

5.3. Analysis of Medical Journals Featuring Articles from Turkish Institutions

The third research question was concerned with the bibliometric profiles of the journals Turkish authors tend to publish their work. The 24,852 articles published by Turkish institutions were distributed over a total number of 2122 journals indexed under the 57 WoS subject categories selected for this study. According to Journal Citation Report's (JCR) 2012 edition, these journals have a median impact factor value of 1.95. According to the JCR 2012, a total of 3572 journals are indexed under these 57 WoS subject categories. These journals have a median impact of 2.02. The percent of publications that were published in a journal with an impact factor lower than 2.02 constitutes % 62 of all the publications by Turkish institutions in 2010-2012. Therefore, the majority of the articles are published in relatively lower impact journals.

When we analyzed the top 20 journals in which Turkish institutions most frequently published their work, we found that *Turkiye Klinikleri Tıp Bilimleri Dergisi* was the most popular journal with a total number of 720 articles from Turkish universities in 2010-2012. This is followed by the *Turkish Journal of Medical Sciences* and *International Journal of Cardiology*. Among the top 20 most popular journals, 12 of them are published in Turkey. The impact factors of these journals ranged between 0.067 and 7.711. Finally, Turkish institutions were also able to publish articles in journals with the highest impact factors in the field of medicine such as *New England Journal of Medicine* (N=22, IF=53.298), *Lancet* (N=11, IF=38.278), *Nature Genetics* (N=26, IF=35.532) and *Cell* (N=3, 32.403).

When the institutions were analyzed individually in terms of their journal preferences, a mixed picture emerged where some institutions tended to most frequently publish at low impact, national journals, whereas some institutions most frequently published in international journals with relatively higher impact factors. We generated a simple score by taking the total number of papers in the top 5 most popular journal at each university. The counts were weighted by the impact factor of the journal. The resulting score highly correlated with the total number of citations received by an institution during 2010-2012, $r = .813$, $p < .001$. A linear regression model based on log-transformed scores and citations suggested that there is a moderate but significant linear relationship that can account for 46% of the variability in total citation values. The regression results suggested that those institutions whose authors tend to aim for publishing their work in high impact journals tend to receive more citations. This is probably due to the fact that such journals have a larger audience and tend to publish more articles, which increase the odds of receiving citations.

5.4. International Collaboration

The fourth research question was concerned with comparing Turkish universities in terms of the percentage of their publications resulting from international collaboration. The number of such publications were 4498, which constitute 13% of all publications in 2010-2012. The results suggested that Istanbul, Hacettepe, Ankara, Ege and Marmara universities produced the most internationally co-authored papers in Turkey. International collaboration more frequently occurred in the case of internal medical sciences. The number of internationally co-authored papers in surgical and basic sciences are much smaller in number in comparison to the medical sciences. Only 10 universities could publish more than 100 articles with co-authors from abroad. Papers that were products of international collaboration form a relatively small percentage of all publications by Turkish institutions.

A correlation analysis showed that there is a strong positive relationship between the number of internationally co-authored papers and the cumulative number of citations received, $r = .966$, $p < .001$. A linear regression model based on log-transformed international papers and total citations suggested that there is a large and significant linear relationship that can account for 78% of the variability in total citation values. This suggests that the more publications with international collaborators a Turkish institute has, the higher their cumulative citation frequency.

5.5. Bibliometric Analysis of Medical Subject Areas

The fifth research question was about comparing Turkish institutions with each other in terms of their overall bibliometric profiles in specific medical subject areas. The subjects grouped under each medical division was analyzed separately for that purpose.

Analysis of medical subjects under the basic medical sciences division revealed that Turkish institutions published mostly in Microbiology, Biochemistry & Molecular Biology, Biology, Biotechnology & Applied Microbiology and Cell Biology subject areas. In Biochemistry & Molecular Biology, Istanbul University leads other universities in terms of the number of publications, followed by other large medical schools Hacettepe and Ankara. However, Ataturk, Ondokuz Mayıs, Ege and Suleyman Demirel universities highlighted with high number of citations relative to their publications. These institutions outperform most universities in Turkey in terms of their citation per publication, which suggest that these universities publish high impact work in this field. In Biotechnology and Applied Microbiology, Ankara, Hacettepe and Ataturk universities forms the top three in terms of publication output and also Ataturk university has a well-organized background in the basic medical sciences. In terms of impact per publication, Gazi and Ege universities stand out with their high CPP values. Finally, Hacettepe, Istanbul, Ankara and Ege universities were noticed among others in terms of the total number of their internationally co-authored publications. Turkish institutions produced the most number of publications in Biochemistry and Biotechnology with international collaborators.

In the division of internal medical sciences, General & Internal Medicine, Pediatrics, Oncology, Pharmacology and Clinical Neurology were noticeable among other basic medical science subjects in terms of their publication frequency. In pediatrics, Hacettepe University led other universities in terms of the number of publications, followed by other large medical schools Istanbul and Ankara. However, Marmara and Gazi universities stood out with high number of citations relative to their publications. These institutions outperformed all universities in Turkey in terms of their citation per publication in pediatrics, which suggest that these universities publish high impact work in this field. Despite its high number of publications in this field, Istanbul University underperformed in terms of citation counts. In Oncology, Hacettepe University led other universities in terms of the number of publications, followed by Istanbul and Ankara. In terms of citation per publication, Ankara, Marmara and GATA stood out among other institutions. Finally, Istanbul, Hacettepe, Ankara and Ege universities stood out among others in terms of the total number of their internationally co-authored publications. Turkish institutions produced the most number of publications in Genetics and Clinical Neurology with international collaborators.

As far as the division of surgical medical sciences is concerned, Surgery, Peripheral Vascular Disease, Obstetrics & Gynecology, and Cardiac & Cardiovascular Systems differentiated themselves among other subject areas in terms of their publication frequency. In the subject area of Surgery, Istanbul, Baskent, Hacettepe, Ankara and GATA took the first five spots in terms of publication frequency. However, the number of citations to Surgery publications were found to be lower than the number of publications, which suggests that Surgery publications in Turkey have relatively lower impact as compared to other subject areas. In the Cardiac & Cardiovascular Systems subject area, Hacettepe, Istanbul, Baskent, GATA and Erciyes published the highest number of articles. However, except Hacettepe University, all Turkish institutions tended to score lower on citation counts, which also indicate that papers published in this subject have relatively low impact. Finally, Istanbul, Hacettepe, Ankara and Ege

universities were noticeable among others in terms of the total number of their internationally co-authored publications in the surgical medical division. Turkish institutions produced the most number of publications in Surgery with international collaborators. However, the total number of international collaborations were found to be lower than other medical divisions such as internal medicine and basic medicine.

5.6. Benchmarking against World Citation per Publication Values

Our final research question is concerned with benchmarking Turkish institutions against the citation per publication values obtained for all publications indexed in WoS in each medical subject area. This analysis aims to identify those medical subject areas where Turkish universities perform at or above the World average. The results suggested that Turkish institutions could exceed the world average only in one subject area, namely Biodiversity Conservation. For all remaining 56 subject areas, Turkish institutions have CPP values lower than the world average. Primary Health Care and Sports Sciences appears to be the fields where the gap is relatively smaller.

In the case of basic medical sciences, even though Turkish universities published a large number of of publications in Biochemistry & Molecular Biology, Biotechnology & Applied Microbiology and Microbiology, the CPP values are almost the half of the world average for all three subjects. As far as internal medical sciences are concerned, Turkish institutions particularly underperform in Neurosciences, which is an increasingly growing field in the world. Turkish institutions have the highest CPP values in fields such as Genetics and Oncology, but the CPP values are lower than the world average in both cases. Finally, Turkish institutions could not exceed the world average in any one of the subject areas related to surgical medicine. The gap between world and national CPP values were the smallest in subject areas such as Andrology and Otorhinolaryngology. However, there was a large gap between key subject areas such as Surgery, Cardiac & Cardiovascular Systems and Cell & Tissue Engineering, which was also hinted by the low citation counts in those subject areas.

CHAPTER 6

CONCLUSIONS AND FUTURE WORK

6.1. Conclusion

The findings of this thesis suggest that there is a steadily growing presence and increasing visibility of Turkish institutions in the medical and life sciences literature in the past few years. As expected, Istanbul University, Hacettepe University, Ankara University, GATA, Ege University, Gazi University, Marmara University and Ataturk University took the top spots in terms of number of publications they made to the medical literature and the recognition they received in the form of citations. Turkish medical researchers have been particularly active in several subject areas such as surgery, cardiac & cardiovascular systems, oncology, pediatrics, microbiology, biochemistry & molecular biology. Several papers by Turkish institutions also appeared in top journals in the respective fields as measured by impact factors. The growing academic output and increasing trend in recognition and the number of international collaborations provide a positive profile for the academic performance of Turkish institutions in medicine and life sciences.

6.2. Future Work

Despite the positive results, when compared against world averages in terms of citation per publication values, Turkish institutions perform below world average in almost all medical subject areas. Turkish institutions are particularly less represented in high impact, cutting edge but costly subject areas such as cell & tissue engineering, neurosciences and pharmacology. Economic factors play an undeniable role on such outcomes, since the cost of producing high impact research in medicine and life sciences require large research & development budgets. The recent bibliometric profile of Turkey is promising given its increasing productivity. However, a shift of focus towards producing more high quality, higher impact work seems to be next logical step to pursue for Turkish institutions. Our analysis indicated positive relationship between the number of citations and the level of international collaboration as well as the impact of targeted journals. Given these empirical insights, Turkish institutions may increase their presence further in the short run by producing higher quality work through international collaborations and publishing their results in widely known and regarded journals. On the long run, strategies for narrowing the gap between key cutting-edge research areas such as genetics, neurosciences and medical technology should be developed and pursued by policy makers in Turkey.

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APPENDICES

APPENDIX A - Distribution of publications

University	Basic M.S	Internal M.S	Surgical M.S	Total Publications
Istanbul Univ	369.28	2072.16	775.04	3216.48
Hacettepe Univ	416.37	1805.90	633.09	2855.36
Ankara Univ	330.42	1123.19	390.46	1844.07
GATA	121.02	724.80	388.58	1234.40
Baskent Univ	69.17	659.88	494.06	1223.11
Marmara Univ	176.03	710.09	264.32	1150.44
Gazi Univ	194.19	691.89	255.32	1141.40
Dokuz Eylul Univ	161.1	686.62	209.71	1057.43
Selcuk Univ	175.66	556.39	229.57	961.62
Ataturk Univ	175.24	560.89	194.50	930.63
Erciyes Univ	153.59	562.74	210.23	926.56
Akdeniz Univ	133.77	480.83	174.12	788.72
Ondokuz Mayıs Univ	121.50	434.15	164.00	719.65
Yuzuncu Yil Univ	82.67	457.20	156.79	696.66
Dicle Univ	126.30	402.20	163.39	691.89
Uludag Univ	92.92	427.21	145.55	665.68
Cukurova Univ	121.97	391.40	102.39	615.76
Karadeniz Tech. Univ	109.60	348.32	135.89	593.81
Kocaeli Univ	56.44	382.11	154.00	592.55
Inonu Univ	60.14	323.14	192.22	575.50
Ege Univ	94.04	379.84	86.77	560.65
Gaziantep Univ	48.81	325.56	154.49	528.86
Cumhuriyet Univ	81.64	284.10	162.16	527.90
Yeditepe Univ	93.96	259.07	160.77	513.80
Firat Univ	97.64	317.78	85.45	500.87
Trakya Univ	67.28	288.75	118.74	474.77
Celal Bayar Univ	69.64	287.86	99.19	456.69
Pamukkale Univ	93.65	262.70	99.58	455.93
Osman Gazi Univ	61.13	270.46	122.19	453.78
Suleyman Demirel Univ	90.13	248.92	108.81	447.86
Adnan Menderes Univ	88.64	234.49	72.63	395.76
Acibadem Univ	21.50	230.25	137.05	388.80
Mersin Univ	56.94	232.45	74.37	363.76
Harran Univ	54.49	216.45	90.99	361.93

Mustafa Kemal Univ	69.50	190.97	79.47	339.94
Fatih Univ	43.98	185.30	108.66	337.94
Bulent Ecevit Univ	31.15	184.42	88.31	303.88
Duzce Univ	18.66	181.33	97.97	297.96
Kirikale Univ	43.80	137.54	105.54	286.88
Abant Izzet Baysal Univ	50.64	149.64	79.64	279.92
Gaziosman Pasa Univ	41.49	137.99	81.49	260.97
Afyon Kocatepe Univ	52.48	129.13	65.31	246.92
Istanbul Bilim Univ	13.82	111.15	68.98	193.95
RTE Univ	43.49	65.50	72.94	181.93
Canakkale Onsekiz Mart Univ	43.66	80.32	33.00	156.98
Balikesir Univ	49.15	61.82	44.00	154.97
Sutcu Imam Univ	24.83	95.64	30.50	150.97
Ufuk Univ	4.99	80.98	56.99	142.96
Namik Kemal Univ	33.30	65.29	38.32	136.91
Maltepe Univ	4.50	58.79	68.64	131.93
Sakarya Univ	33.50	73.98	12.49	119.97
Dumlupinar Univ	24.00	48.50	34.50	107.00
Kafkas Univ	10.49	69.30	27.16	106.95
Koc Univ	51.95	33.16	16.83	101.94
Bozok Univ	22.33	37.15	25.5	84.98
Adiyaman Univ	21.99	43.48	9.50	74.97
Yildirim Beyazit Univ	7.80	42.82	22.33	72.95
Ordu Univ	13.00	28.50	7.50	49.00
Erzincan Univ	17.00	25.00	6.00	48.00
Katip Celebi Univ	5.50	16.48	25.96	47.94
Ahi Evran Univ	18.99	12.99	4	35.98
Medipol Univ	1.50	21.66	9.83	32.99
Giresun Univ	6.00	20.00	6.00	32.00
Hitit Univ	21.00	10.00	0.00	31.00
Necmettin Erbakan Univ	5.66	22.33	3.00	30.99
Yeni Yuzyil Univ	1.50	11.99	4.49	17.98
Karabuk Univ	7.99	5.00	4.00	16.99
Sifa Univ	4.00	5.49	1.50	10.99
Izmir Univ	3.50	2.50	1.00	7.00
Sitki Kocman Univ	3.50	1.50	0.00	5.00
Bezm Alem Univ	0.00	3.00	1.00	4.00
Mevlana Univ	0.00	3.00	0.00	3.00

APPENDIX B - Distribution of citations

University	Basic M.S	Internal M.S	Surgical M.S	Total Citations
Istanbul Univ	451.58	3762.4	815.76	5029.74
Hacettepe Univ	764.88	2925.14	874.46	4564.48
Ankara Univ	466.97	1838.26	399.02	2704.25
GATA	95.27	865.03	393.17	1353.47
Baskent Univ	56.16	728.94	419.32	1204.42
Marmara Univ	255.51	1207.13	267.63	1730.27
Gazi Univ	450.98	1244.97	310.16	2006.11
Dokuz Eylul Univ	223.28	611.61	175.29	1010.18
Selcuk Univ	265.12	462.59	182.9	910.61
Ataturk Univ	457.51	742.35	177.63	1377.49
Erciyes Univ	143.4	644.91	294.25	1082.56
Akdeniz Univ	160.13	482.6	201.16	843.89
Ondokuz Mayıs Univ	225.55	598.24	164.77	988.56
Yuzuncu Yil Univ	156.82	537.68	181.89	876.39
Dicle Univ	112.66	273.64	91.66	477.96
Uludag Univ	154.44	764.65	166.63	1085.72
Cukurova Univ	214.96	485.56	113.31	813.83
Karadeniz Tech. Univ	123.97	390.4	126.46	640.83
Kocaeli Univ	76.39	341.51	129.53	547.43
Inonu Univ	113.82	267.29	130.8	511.91
Ege Univ	376.72	809.18	194.48	1380.38
Gaziantep Univ	70.79	277.62	123.5	471.91
Cumhuriyet Univ	85.47	185.94	165.5	436.91
Yeditepe Univ	100.63	435.05	189.91	725.59
Firat Univ	150.15	323.32	105.48	578.95
Trakya Univ	77.13	158.55	73.14	308.82
Celal Bayar Univ	75.82	258.16	154.74	488.72
Pamukkale Univ	95.48	153.96	71.5	320.94
Osman Gazi Univ	101.15	192.93	97.75	391.83
Suleyman Demirel Univ	179.97	272.94	100.97	553.88
Adnan Menderes Univ	151.42	212.8	73.15	437.37
Acibadem Univ	23.5	131.07	131.18	286.00
Mersin Univ	79.13	210.88	64.79	354.80
Harran Univ	88.16	199.8	91	378.96

Mustafa Kemal Univ	91	129.32	51.66	272.00
Fatih Univ	44	161.44	111.5	316.94
Bulent Ecevit Univ	27.14	142.57	80.15	250.00
Duzce Univ	50	105	127.98	282.98
Kirikale Univ	65.99	153.56	90.34	309.89
Abant Izzet Baysal Univ	55.5	87	64.49	206.99
Gazosman Pasa Univ	64.98	111.64	46.3	223.00
Afyon Kocatepe Univ	64.5	181.97	34.49	280.96
Istanbul Bilim Univ	17.5	102.99	93.48	213.97
RTE Univ	0	0	0	0.00
Canakkale Onsekiz Mart Univ	71.5	45	20.5	137.00
Balikesir Univ	35.29	48.59	73	156.88
Sutcu Imam Univ	41.83	66.63	23.5	132.00
Ufuk Univ	2.32	183.99	76.66	262.97
Namik Kemal Univ	45	26.99	35	106.99
Maltepe Univ	2.5	35.48	58.95	96.93
Sakarya Univ	61	28.64	3.33	92.97
Dumlupinar Univ	25.5	77.5	25	128.00
Kafkas Univ	3.33	61.16	23.5	87.99
Koc Univ	95.73	26.33	9.83	132.00
Bozok Univ	39.60	33.82	7.50	80.92
Adiyaman Univ	36	25	0	61.00
Yildirim Beyazit Univ	0	7	2	9.00
Ordu Univ	7	19	1	27.00
Erzincan Univ	8.5	19	1.5	29.00
Katip Celebi Univ	1	0	5.97	7.00
Ahi Evran Univ	16.90	10.49	8.00	35.39
Medipol Univ	0	11.66	3.33	15.00
Giresun Univ	8	36	0	44.00
Hitit Univ	14.5	13.5	0	28.00
Necmettin Erbakan Univ	0	0	0	0.00
Yeni Yuzyil Univ	0	7.5	3.5	11.00
Karabuk Univ	5.5	2.5	0	8.00
Sifa Univ	2	0	0	2.00
Izmir Univ	1	0	1	2.00
Sitki Kocman Univ	0	0	0	0.00
Bezm Alem Univ	0	1	0	1.00
Mevlana Univ	0	1	0	1.00

APPENDIX C - Distribution of Citation per Publication

Basic Medical Science			
	Publication	Citation	CPP
Anatomy & Morphology	181.01	113.95	0.63
Biochemical Research Methods	257.62	293.64	1.14
Biochemistry & Molecular Biology	1264.73	2061.37	1.63
Biodiversity Conservation	20.00	56.00	2.80
Biology	397.01	477.54	1.20
Biophysics	106.28	250.55	2.36
Biotechnology & Applied Microbiology	786.77	1430.34	1.82
Cell Biology	312.54	629.81	2.02
Developmental Biology	52.32	76.00	1.45
Engineering, Biomedical	235.98	401.74	1.70
Evolutionary Biology	61.98	81.60	1.32
Health Care Sciences & Services	231.16	273.83	1.18
Mathematical & Computational Biology	28.79	48.83	1.70
Medical Ethics	45.72	12.60	0.28
Medical Informatics	70.83	70.33	0.99
Medical Laboratory Technology	222.65	308.00	1.38
Microbiology	672.50	781.80	1.16
Parasitology	122.32	239.32	1.96
Physiology	530.00	271.00	0.51
Internal Medical Sciences			
	Publication	Citation	CPP
Allergy	190.34	287.77	1.51
Behavioral Sciences	40.33	64.00	1.59
Chemistry, Medicinal	554.47	1115.73	2.01
Clinical Neurology	1345.80	1739.42	1.29
Dermatology	586.59	377.92	0.64
Emergency Medicine	465.75	235.50	0.51
Endocrinology & Metabolism	836.96	1277.27	1.53
Gastroenterology & Hepatology	979.22	1218.55	1.24
Genetics & Heredity	637.52	1917.62	3.01
Geriatrics & Gerontology	296.15	304.50	1.03
Hematology	749.37	1242.68	1.66
Hematology	70.00	58.00	0.83

Immunology	521.83	971.61	1.86
Infectious Diseases	387.72	858.02	2.21
Medicine, General & Internal	3225.16	2364.83	0.73
Neurosciences	893.10	1152.29	1.29
Nutrition & Dietetics	333.26	800.44	2.40
Oncology	1681.24	1979.58	1.18
Pediatrics	1937.30	1687.68	0.87
Pharmacology & Pharmacy	1388.65	1759.81	1.27
Primary Health Care	9.00	16.50	1.83
Psychiatry	642.49	553.34	0.86
Radiology, Nuclear Medicine & Medical Imaging	1018.46	1128.54	1.11
Rheumatology	1038.50	1691.50	1.63
Sport Sciences	264.22	314.65	1.63
Surgical Medical Sciences			
	Publication	Citation	CPP
Andrology	50.00	58.00	1.16
Anesthesiology	165.40	263.32	1.59
Cardiac & Cardiovascular Systems	1664.72	1357.85	0.82
Cell & Tissue Engineering	28.24	42.10	1.49
Critical Care Medicine	125.65	260.75	2.08
Obstetrics & Gynecology	1208.00	1380.00	1.14
Ophthalmology	456.50	572.50	1.25
Orthopedics	337.97	350.65	1.04
Otorhinolaryngology	517.33	434.50	0.84
Pathology	437.65	445.01	1.02
Peripheral Vascular Disease	441.07	704.24	1.60
Respiratory System	229.32	384.36	1.68
Surgery	2227.21	1804.24	0.81
Transplantation	275.21	271.33	0.99

APPENDIX D - Distribution of Instructor

University	Medical Faculty	Total Faculty
Istanbul Univ	2060	5476
Gazi Univ	966	4192
Ankara Univ	1017	3807
Hacettepe Univ	1028	3746
Selcuk Univ	920	3633
Ege Univ	970	3181
Dokuz Eylül Univ	930	3119
Marmara Univ	452	2670
Atatürk Univ	520	2388
Uludag Univ	701	2218
Akdeniz Univ	702	2152
Karadeniz Tech. Univ	553	2129
Erciyes Univ	696	2054
Kocaeli Univ	449	1966
Suleyman Demirel Univ	361	1901
Ondokuz Mayıs Univ	665	1728
Cukurova Univ	436	1599
Sakarya Univ	55	1546
Fırat Univ	431	1496
Cumhuriyet Univ	451	1472
Baskent Univ	714	1391
Trakya Univ	524	1349
Mersin Univ	390	1346
Inonu Univ	462	1301
Yuzuncu Yil Univ	336	1294
Dicle Univ	376	1270
Osman Gazi Univ	488	1262
Pamukkale Univ	321	1224
Adnan Menderes Univ	362	1217
Afyon Kocatepe Univ	248	1102
Celal Bayar Univ	404	1099
Canakkale Onsekiz Mart Univ	104	1085
Abant İzzet Baysal Univ	316	1044
Gaziantep Univ	398	993
Sıtkı Koçman Univ	24	981
Yeditepe Univ	141	963

Mustafa Kemal Univ	283	948
Sutcu Imam Univ	231	945
Gaziosman Pasa Univ	215	937
Bulent Ecevit Univ	305	922
Kırıkale Univ	258	885
Balıkesir Univ	49	876
Harran Univ	267	846
Dumlupınar Univ	33	811
GATA	506	759
Fatih Univ	182	735
RTE Univ	107	602
Erzincan Univ	39	589
Kafkas Univ	3	513
Karabuk Univ	5	503
Namık Kemal Univ	91	493
Düzce Univ	205	486
Maltepe Univ	111	454
Adıyaman Univ	36	433
Ahi Evran	6	431
Bozok Univ	24	398
Bezm-i Alem Univ	317	368
Hitit Univ		367
Koc Univ	20	351
Giresun Univ	11	311
Ufuk Univ	155	269
Ordu Univ	9	268
Acıbadem Univ	179	233
Istanbul Bilim Univ	151	203
İzmir Univ	35	171
Yeni Yuzyil Univ	18	156
Yıldırım Beyazıt Univ	27	130
Mevlana Univ	18	98
Medipol Univ	35	90
Sifa Univ	50	82

APPENDIX E - Distribution of Collaboration

University	Basic M. S	Internal M.S	Surgical M.S	Total Collaboration
Istanbul Univ	108	393	126	627
Hacettepe Univ	111	306	91	508
Ankara Univ	96	221	58	375
Ege Univ	93	167	38	298
Marmara Univ	46	128	36	210
Gazi Univ	36	120	17	173
Akdeniz Univ	40	65	34	139
Dokuz Eylul Univ	29	85	20	134
Uludag Univ	31	67	22	120
Ataturk Univ	60	47	3	110
Yeditepe Univ	23	55	20	98
Erciyes Univ	24	57	16	97
Baskent Univ	12	42	33	87
GATA	11	46	28	85
Selcuk Univ	28	40	17	85
Cukurova Univ	28	44	12	84
Ondokuz Mayıs Univ	25	41	9	75
Firat Univ	17	42	5	64
Koc Univ	37	20	7	64
Yuzuncu Yil Univ	14	33	13	60
Suleyman Demirel Univ	20	29	6	55
Osman Gazi Univ	13	28	12	53
Pamukkale Univ	13	28	12	53
Adnan Menderes Univ	21	22	8	51
Karadeniz Tech. Univ	16	27	6	49
Mersin Univ	11	26	10	47
Kocaeli Univ	6	26	13	45
Dicle Univ	12	26	4	42
Celal Bayar Univ	5	24	12	41
Abant Izzet Baysal Univ	13	19	6	38
Mustafa Kemal Univ	12	11	13	36
Gaziantep Univ	7	17	9	33
Istanbul Bilim Univ	7	19	6	32
Inonu Univ	7	16	8	31
Kirikale Univ	8	14	8	30
Balikesir Univ	11	7	10	28

Namik Kemal Univ	11	15	0	26
Trakya Univ	7	18	1	26
Cumhuriyet Univ	5	12	8	25
Harran Univ	10	14	1	25
Ufuk Univ	2	16	5	23
Bulent Ecevit Univ	2	10	9	21
Fatih Univ	7	11	3	21
Afyon Kocatepe Univ	4	14	2	20
Gaziosman Pasa Univ	3	9	8	20
Sitki Kocman Univ	8	5	4	17
Sutcu Imam Univ	6	7	4	17
Dumlupinar Univ	10	5	1	16
Sakarya Univ	7	6	1	14
RTE Univ	5	1	7	13
Adiyaman Univ	6	5	1	12
Canakkale Onsekiz Mart Univ	6	1	1	8
Kafkas Univ	1	7	0	8
Bozok Univ	5	1	0	6
Ahi Evran Univ	4	1	0	5
Duzce Univ	2	3	0	5
Erzincan Univ	3	2	0	5
Karabuk Univ	2	1	0	3
Ordu Univ	1	1	0	2
Giresun Univ	1	0	0	1
Hitit Univ	1	0	0	1
Maltepe Univ	0	1	0	1
Izmir Univ	0	0	0	0
Total	1170	2524	804	4498

APPENDIX F - Distribution of Journal Impact Factor According to Count Ranking

Univesity	Count of Publication	Impact Factor
Hacettepe Univ		
Int J Cardiol	80	7.078
Turkish J Pediatr	78	0.441
J Inherit Metab Dis	61	3.577
Pediatr Nephrol	41	2.518
Turk Klin Tip Bilim	39	0.102
Istanbul Univ		
Turk Pediatr Arsivi	68	0.067
J Craniofac Surg	63	0.822
Turk Klin Tip Bilim	56	0.102
Clin Exp Rheumatol	48	2.148
Arthritis Rheum-Us	40	7.866
Atatürk Univ		
Turk J Med Sci	41	0.139
Osteoporosis Int	36	4.58
Int J Cardiol	34	7.078
Healthmed	31	0.435
Photomed Laser Surg	19	1.255
Ankara Univ		
Turk J Hematol	37	0.341
Febs J	31	3.79
Turk Klin Tip Bilim	30	0.102
Pediatr Nephrol	30	2.518
Turk J Gastroenterol	27	0.472
Dicle Univ		
Eur Rev Med Pharmacol	32	1.04
Turk Klin Tip Bilim	23	0.102
Biotechnol Biotec Eq	13	0.76
Int J Cardiol	13	7.078
Ulus Travma Acil Cer	11	0.333
Baskent Univ		
Turk Neurosurg	27	0.624
Transpl P	26	1.005
Pediatr Nephrol	24	2.518
Turk J Hematol	22	0.341
Turk Gogus Kalp Dama	22	0.094
Gata		
Turk Neurosurg	26	0.624
Turk Klin Tip Bilim	25	0.102
J Neurol	23	3.473
Int J Cardiol	22	7.078
Eur J Neurol	21	3.692
Erciyes Univ		

Curr Opin Biotech	32	7.711
Eur Heart J	22	10.478
Turk Klin Tip Bilim	21	0.102
Child Nerv Syst	17	1.542
Pediatr Nephrol	16	2.518
Selcuk Univ		
Turk Klin Tip Bilim	22	0.102
Int J Cardiol	17	7.078
Bratisl Med J	13	0.403
Biol Trace Elem Res	12	1.923
Anadolu Kardiyol Der	11	0.439
Akdeniz Univ		
Pediatr Nephrol	25	2.518
Planta Med	22	2.153
Virchows Arch	19	2.491
Turk Klin Tip Bilim	19	0.102
Bone Marrow Transpl	16	3.746
Marmara Univ		
Febs J	20	3.79
Clin Exp Rheumatol	18	2.148
Arthritis Rheum-Us	16	7.866
Epilepsia	16	3.961
Int J Clin Pharm-Net	15	0
Inonu Univ		
Eur Rev Med Pharmacol	28	1.04
Liver Transplant	26	3.386
Turk Klin Tip Bilim	17	0.102
Transpl P	15	1.005
Healthmed	14	0.435
Gazi Univ		
Turk Klin Tip Bilim	31	0.102
Planta Med	19	2.153
Febs J	18	3.79
J Ethnopharmacol	16	3.014
J Inherit Metab Dis	15	3.577
Yuzuncu Yil Univ		
Turk Klin Tip Bilim	24	0.102
Pak J Med Sci	22	0.161
Asian Pac J Cancer P	19	0.659
Ulus Travma Acil Cer	13	0.333
Clin Appl Thromb-Hem	13	1.332
Trakya Univ		
Int J Cardiol	17	7.078
Turk Klin Tip Bilim	15	0.102
J Mol Histol	11	1.484
Hippokratia	8	0.525
Cumhuriyet Univ		

Healthmed	32	0.435
Int J Cardiol	24	7.078
Turk Gogus Kalp Dama	11	0.094
Turk Klin Tip Bilim	11	0.102
Postep Kardiol Inter	11	0.215
Ondokuz Mayıs Univ		
Turk Klin Tip Bilim	19	0.102
J Craniofac Surg	16	0.822
Pediatr Nephrol	15	2.518
Healthmed	12	0.435
Anadolu Psikiyat De	8	0.136
Osman Gazi Univ		
Turk Klin Tip Bilim	14	0.102
Pak J Med Sci	13	0.161
Anadolu Kardiyol Der	12	0.439
Eur Arch Oto-Rhino-L	8	1.287
Rheumatol Int	8	1.885
Karadeniz Tech. Univ		
Turk Klin Tip Bilim	22	0.102
Bratisl Med J	11	0.403
Turk J Hematol	9	0.341
Turk J Biol	9	0.876
Anadolu Kardiyol Der	9	0.439
Uludag Univ		
Turk Klin Tip Bilim	18	0.102
Turk Pediatr Arsivi	12	0.067
Ulus Travma Acil Cer	10	0.333
J Neurol Sci-Turk	9	0.058
Turk J Med Sci	7	0.139
Kocaeli Univ		
Turk Klin Tip Bilim	20	0.102
Pediatr Nephrol	18	2.518
Eur Neuropsychopharm	15	4.046
Anadolu Psikiyat De	10	0.136
Mikrobiyol Bul	10	0.402
Cukurova Univ		
Turk Klin Tip Bilim	19	0.102
Asian Pac J Cancer P	16	0.659
Pediatr Nephrol	16	2.518
Noropsikiyatri Ars	11	0.165
Turk J Gastroenterol	10	0.472
Fırat Univ		
Turk Klin Tip Bilim	21	0.102
Turk J Med Sci	10	0.139
Biol Trace Elem Res	10	1.923
Healthmed	10	0.435
Klin Psikofarmakol B	9	0.26
Mersin Univ		
Turk Klin Tip Bilim	17	0.102
Mikrobiyol Bul	10	0.402
J Craniofac Surg	9	0.822

Turk Pediatr Arsivi	7	0.067
Turk J Gastroenterol	5	0.472
Suleyman Demirel Univ		
Biol Trace Elem Res	19	1.923
Turk Klin Tip Bilim	15	0.102
Healthmed	12	0.435
J Membrane Biol	11	1.808
Anadolu Kardiyol Der	10	0.439
Fatih Univ		
Turk J Med Sci	22	0.139
J Matern-Fetal Neo M	9	1.495
Curr Opin Biotech	9	7.711
Arch Gynecol Obstet	8	1.277
Turk J Gastroenterol	6	0.472
Pamukkale Univ		
Anadolu Kardiyol Der	15	0.439
Febs J	15	3.79
Turk Klin Tip Bilim	13	0.102
Turk Gogus Kalp Dama	12	0.094
Ekleml Hast Cerrahisi	11	0.708
Acibadem Univ		
J Neurol Sci-Turk	12	0.058
Turk Gogus Kalp Dama	11	0.094
Anadolu Kardiyol Der	11	0.439
Turk Neurosurg	10	0.624
J Craniofac Surg	10	0.822
Adnan Menderes Univ		
Healthmed	13	0.435
Turk J Rheumatol	9	0.191
Child Nerv Syst	9	1.542
Turkish J Pediatr	8	0.441
Gynecol Endocrinol	8	1.581
Ege Univ		
Pediatr Nephrol	16	2.518
Turk Klin Tip Bilim	13	0.102
Asian Pac J Cancer P	12	0.659
Haematol-Hematol J	12	6.424
Haemophilia	9	2.597
Canakkale Onsekiz Mart Univ		
Asian Pac J Cancer P	11	0.659
Nobel Med	5	0.036
Turk Klin Tip Bilim	5	0.102
Rom Biotech Lett	4	0.349
Curr Nanosci	3	1.776
Celal Bayar Univ		
Turk Klin Tip Bilim	18	0.102
Pediatr Nephrol	12	2.518
Cutan Ocul Toxicol	11	0.912
Bipolar Disord	9	5.289

Mustafa Kemal Univ		
Pak J Med Sci	17	0.161
Turk Klin Tip Bilim	9	0.102
Virchows Arch	8	2.491
Turk J Med Sci	6	0.139
J Int Med Res	6	0.896
Namık Kemal Univ		
Artif Cell Blood Sub	6	0.975
Turk Klin Tip Bilim	6	0.102
Pharmacol Biochem Be	3	2.532
Turk Gogus Kalp Dama	2	0.094
J Voice	2	1.39
Harran Univ		
Turk Klin Tip Bilim	12	0.102
Turk J Med Sci	12	0.139
J Clin Lab Anal	9	1.384
Ulus Travma Acil Cer	8	0.333
Bulent Ecevit Univ		
Turk Klin Tip Bilim	9	0.102
Turk J Gastroenterol	8	0.472
Wien Klin Wochenschr	6	0.809
Turk J Med Sci	5	0.139
Healthmed	5	0.435
Gaziantep Univ		
Rheumatol Int	9	1.885
Turk Klin Tip Bilim	9	0.102
Ulus Travma Acil Cer	8	0.333
Asian Pac J Cancer P	8	0.659
Allergy	8	6.271
Sutcu Imam Univ		
Turk Klin Tip Bilim	10	0.102
J Med Syst	5	1.132
Turk J Med Sci	4	0.139
Bratisl Med J	3	0.403
Turk J Biol	3	0.876
Kırıkale Univ		
Turk J Med Sci	11	0.139
J Craniofac Surg	9	0.822
Fertil Steril	7	3.775
Eklemler Hast Cerrahisi	6	0.708
Turk J Biol	5	0.876
Yeditepe Univ		
Curr Opin Biotech	12	7.711
J Ethnopharmacol	11	3.014
Febs J	9	3.79
Planta Med	8	2.153
Photomed Laser Surg	8	1.255
Balıkesir Univ		
Febs J	17	3.79
Coronary Artery Dis	11	1.237

J Enzym Inhib Med Ch	7	1.617
Int J Cardiol	5	7.078
Anadolu Kardiyol Der	5	0.439
Gaziosman Pasa Univ		
Turk Klin Tip Bilim	15	0.102
Turk J Med Sci	11	0.139
Anadolu Kardiyol Der	7	0.439
Int J Pediatr Otorhi	6	1.167
Turk Gogus Kalp Dama	6	0.094
Sakarya Univ		
Healthmed	16	0.435
J Med Syst	9	1.132
Curr Opin Biotech	4	7.711
Pak J Med Sci	4	0.161
Turk J Biol	3	0.876
Düzce Univ		
Turk Klin Tip Bilim	12	0.102
Healthmed	8	0.435
Virchows Arch	7	2.491
Turk Gogus Kalp Dama	7	0.094
Turk J Med Sci	7	0.139
Afyon Kocatepe Univ		
J Ethnopharmacol	15	3.014
Mol Biol Rep	5	2.929
Helicobacter	5	3.151
Turk Klin Tip Bilim	5	0.102
Biol Trace Elem Res	5	1.923
J Hypertens	5	4.021
Ufuk Univ		
Fertil Steril	7	3.775
Arch Med Sci	6	1.214
Turk Klin Tip Bilim	5	0.102
Turk Neurosurg	5	0.624
Turk J Med Sci	4	0.139
Clin Rheumatol	4	1.996
Int J Cardiol	4	7.078
Abant İzzet Baysal Univ		
Turk Klin Tip Bilim	7	0.102
Turk J Gastroenterol	6	0.472
Turk J Med Sci	6	0.139
Planta Med	6	2.153
Noropsikiyatri Ars	5	0.165
Rheumatol Int	5	1.885
Medipol Univ		
J Craniofac Surg	2	0.822
J Matern-Fetal Neo M	2	1.495
Acta Paediatr	2	2.073
J Neurotraum	1	3.654
Pulm Pharmacol Ther	1	2.8

Recep Tayyip Erdoğan Univ		
Eur Heart J	6	10.478
Turk Neurosurg	6	0.624
Turk J Biochem	5	0.258
Anadolu Kardiyol Der	4	0.439
Turk J Med Sci	4	0.139
Hitit Univ		
Febs J	10	3.79
Caryologia	2	0.533
Plant Syst Evol	2	1.335
Chromatographia	2	1.195
Microbiol Immunol	1	1.304
Istanbu Bilim Univ		
Int J Radiat Oncol	6	4.105
Noropsikiyatri Ars	6	0.165
Clin Exp Obstet Gyn	5	0.429
Epilepsia	5	3.961
Eur J Neurol	5	3.692
Dumlupınar Univ		
J Med Syst	6	1.132
Cardiovasc Ther	5	2.353
J Enzym Inhib Med Ch	4	1.617
Eur Arch Oto-Rhino-L	4	1.287
Acta Orthop Traumatol	3	0.337
Erzincan Univ		
Rom Biotech Lett	3	0.349
Cardiovasc Ther	3	2.353
Mol Cell Biochem	2	2.057
J Enzym Inhib Med Ch	2	1.617
Int J Pharmacol	2	1.503
Maltepe Univ		
Turk Gogus Kalp Dama	8	0.094
Arch Gynecol Obstet	4	1.277
Sleep Breath	4	1.839
Eur J Obstet Gyn R B	4	1.974
Int J Cardiol	4	7.078
Ordu Univ		
J Neurol Sci-Turk	4	0.058
Mikrobiyol Bul	4	0.402
Healthmed	4	0.435
Asian Pac J Cancer P	3	0.659
Ulus Travma Acil Cer	2	0.333
Koc Univ		
Nucleic Acids Res	4	8.026
Proteins	4	3.392
Clin Hemorheol Micro	4	3.398
Turk Neurosurg	3	0.624
Clin Neurophysiol	3	3.406
Yıldırım Beyazıt Univ		
Turk J Med Sci	9	0.139

Genet Counsel	3	0.505
Neuroquantology	3	0.559
J Pediatr Endocr Met	3	0.875
Lab Invest	3	3.641
Adıyaman Univ		
Mol Biol Rep	4	2.929
Curr Opin Biotech	4	7.711
Turk Klin Tip Bilim	3	0.102
Cancer Epidemiol	3	2.01
Asian Pac J Cancer P	3	0.659
Gene	3	2.341
Kafkas Univ		
Ulus Travma Acil Cer	6	0.333
Eur J Oncol Nurs	4	1.41
Vector-Borne Zoonot	3	2.437
Saudi Med J	3	0.52
Turk J Geriatr	3	0.106
Yeni Yuzyil Univ		
Planta Med	2	2.153
Oncol Lett	2	0.108
Genet Mol Res	1	1.184
World J Gastroentero	1	2.471
Turk Gogus Kalp Dama	1	0.094
Katip Çelebi Univ		
Ann Vasc Surg	5	1.035
Pediatr Nephrol	4	2.518
Eur J Vasc Endovasc	4	2.991
Ann Thorac Surg	2	3.741
Anadolu Kardiyol Der	2	0.439
Karabuk Univ		
Biol Trace Elem Res	3	1.923
Afr J Microbiol Res	2	0.539
J Int Adv Otol	1	0.136
Am J Rhinol Allergy	1	2.302
J Liposome Res	1	1.707
Necmettin Erbakan Univ		
J Clin Immunol	5	3.077
J Pediatr Endocr Met	4	0.875
Int J Psychiat Clin	3	0.427
Pak J Med Sci	2	0.161
Early Hum Dev	2	2.046
Giresun Univ		
J Med Food	4	1.408
Asian Pac J Cancer P	3	0.659
Turk J Biol	2	0.876
Drug Metab Rev	2	6.4
Int J Med Sci	2	2.244
Sifa Univ		
Mol Cell Probe	1	2.078
Behav Pharmacol	1	2.72
Turk Gogus Kalp Dama	1	0.094

Endocrine	1	1.416
Mikrobiyol Bul	1	0.402
Izmir Univ		
Mol Biol Rep	2	2.929
J Cardiothorac Surg	1	1.187
J Hum Kinet	1	0.329
Biomed Tech	1	0.855
Afr J Pharm Pharmacol	1	0.839
Hemoglobin	1	1.304
Sitki Koçman Univ		
Proteins	1	3.392
Biomed Opt Express	1	2.333
Wspolczesna Onkol	1	0.107
J Biol Res-Thessalon	1	0.619
J Chromatogr B	1	2.888
Bezm-I Alem Univ		
J Hepatol	1	9.264
Int J Rheum Dis	1	0.807
Hepatology	1	11.665
Int J Cardiol	1	7.078
Mevlana Univ		
Diabetes Care	1	8.087
Turk Klin Tip Bilim	1	0.102
Nobel Med	1	0.036

APPENDIX G - Distribution of Basic Medical Sciences Publications

University	Cell Biology	Biochemistry & Molecular Biology	Parasitology	Biology	Evolutionary Biology	Medical Laboratory Technology	Biodiversity Conservation	Microbiology	Psychology	Biochemical Research Methods	Medical Informatics	Biophysics	Mathematical & Computational Biology	Medical Ethics	Biotechnology & Applied Microbiology	Engineering, Biomedical	Health Care Sciences & Services	Anatomy & Morphology	Developmental Biology	Total
Hacettepe Univ	26	109	4	19	5	13	2	49	6	27	5	18	2	3	48	41	33	5	2	416
Istanbul Univ	23	119	5	17	3	27	1	42	3	21	6	4	2	2	38	24	23	5	5	369
Ankara Univ	17	94	2	20	6	11	1	37	2	26	1	7	1	4	57	13	12	15	5	330
Gazi Univ	10	67	3	20	1	5	1	23		8	4	6		2	32	5	8		1	194
Selcuk Univ	3	45	1	22	2	4		18	1	8	6	1	1	1	32	15	8	9	1	176
Marmara Univ	10	46	0	9		13		20	2	6	1	4	1	4	31	16	14	1		176
Ataturk Univ	7	42	11	23	1	7	2	17	1	10		3		1	41	1	2	7		175
Dokuz Eylul Univ	5	35	1	4	0	4	2	26	8	8	6	3	1		35	4	7	9	3	161
Erciyes Univ	3	17	5	25	2	4	1	24	1	18	2	1	3	3	31	6	5	7		154
Akdeniz Univ	15	38	5	5	3	14	2	8	1	9	1	1	1	1	22	2	5	1	2	134
Dicle Univ	6	23	3	9	1	4		15		6	1	2			29	2	4	19	4	126
Cukurova Univ	6	26	7	10	1	1	2	9		6	5	2	0	1	27	5	11	2	2	122
Ondokuz Mayıs Univ	10	23	6	11		7		31	0	3	2	3		0	10	4	4	6	1	122
GATA	9	24	0	4		20		16	1	4	2	1	2	2	3	9	8	12	3	119
Karadeniz Tech. Univ	4	16	3	16	3	6		21		5	2	3	1	2	20	4	3	1	1	110

Firat Univ	13	29	15	6		3		10		3	3	1			8	3	2	1	2	97
Ege Univ	2	25	3	4	2	2		13	1	4		3	3		21	6	5	2		94
Pamukkale Univ	5	37	3	5	3	6	2	13		3	1		2		9	2	2	1	1	94
Uludag Univ	8	17	9	8		8		12	1	2	2	2			11		5	5	4	93
Yeditepe Univ	2	31		3	1	1		8		7	1	2	1		15	12	6	2		91
Suleyman Demirel Univ	17	32	1	5	1	3		8	0	3	1	1	1		10	2	2	4	1	90
Adnan Menderes Univ	3	17	7	3	3	5		19	0	3		7	0		17	1	3	2		89
Yuzuncu Yil Univ	9	19	1	16	3	6		8	1	2		1		2	11	2		2	1	83
Cumhuriyet Univ	2	18	9	9	3	3		11		3	0	2			10	2	1	8	2	82
Celal Bayar Univ	9	13	2	12	1	2		14		1	1	1			5	2	5	1		70
Mustafa Kemal Univ	5	16	2	5	2	1		14		1	1				16	1	1	3	4	70
Baskent Univ	3	13		1		2		11		2	3	1	1	0	4	5	14	9	1	69
Trakya Univ	14	8	1	11	4	2	2	4		3		1		1	8	2	4	2	1	67
Inonu Univ	1	7	1	3	1	2		19	1	5		2		2	12	1	2	1	1	60
Osman Gazi Univ	5	16	1	4	1			11		3			1	0	11	2	2	2		60
Mersin Univ	4	15		4	1	3	1	12		2	1	1		0	5	3	3	3		57
Kocaeli Univ	6	5		6		1		15			3	1	1	2	11	2	4	1		56
Harran Univ	3	8	1	1		16		10		2		1		3	8		2	1		54
Koc Univ	4	14		3				1	2	8		6	1		5	7		1		52
Abant Izzet Baysal Univ	3	7	0	9	2	3		7		1		3		1	14			1	1	51
Afyon Kocatepe Univ	3	17	1	6		2		9		1	1				1	2	1	8		50
Balikesir Univ		30	1	4				4		2		1	1		4	2		1		49
Gaziantep Univ	4	9		0		2		4		1	2	1	1		7	5	6	7		48
Fatih Univ	5	7		1		2		4		7	2	1	1	0	6	6	3	1	1	44
Kirikale Univ	3	9	2	9				5							12	2	1	1	0	44
Canakkale Onsekiz Mart Univ	0	7	2	4	1			6		4		4			13	1		3		44

RTE Univ	5	11		7	1	2		7		1	1			9			1		43	
Gaziosman Pasa Univ	4	11	2	3	1	2		10		2	1			3	1	1		2	41	
Sakarya Univ	2	2		7				2		3	5			8	2	5			34	
Namik Kemal Univ	2	5	2	2	1			2		3		1	1	1	8	5		0	1	33
Bulent Ecevit Univ	2	9		2				7			1	2		0	2	3	2	3		31
Sutcu Imam Univ		3		4		2		7			3			4		3				25
Dumlupinar Univ		8		2		1	1	2	1	1	3	2		2	1	3				24
Bozok Univ	1	2		7		1		0		3	2	1		5	1	2				22
Adiyaman Univ	2	11	1							2				4				2		22
Acibadem Univ	3	9				1		2	1	1		1		3	1		1	1		22
Hitit Univ	1	11			2			2		3		1		2						21
Ahi Evran Univ		2		7	2		1	2		1		1		4			1			19
Duzce Univ	2	3						2		1				0	9		1	1		19
Erzincan Univ	2	5		1		2	1					2		5						17
Istanbul Bilim Univ	3	4				1			1		1			0	0	2	2			14
Ordu Univ		3						8						3						13
Kafkas Univ	1			2	1	0		2	0	1				2			2			10
Karabuk Univ		3		0				2					0	1	1					8
Yildirim Beyazit Univ		2		0		2		1					0	1	1	0		0		8
Giresun Univ		2		2				1						1						6
Necmettin Erbakan Univ		4												0	0			1		6
Katip Celebi Univ	1	1				1		2				1		2						6
Ufuk Univ	1	2							1					0	0			1		5
Maltepe Univ		1				1		2						1						4
Sifa Univ	0	1						2		0				0						4
Izmir Univ		3									1				1					4

Sitki Kocman Univ		1		1						2		1							4	
Medipol Univ		2																	2	
Yeni Yuzyil Univ		2																	2	
Bezm Alem Univ																			0	
Mevlana Univ																			0	
Total	313	1265	122	397	62	223	20	673	35	258	71	106	29	46	787	236	231	181	52	5105

APPENDIX H - Distribution of Internal Medical Sciences Publications

University	Immunology	Radiology, Nuclear Medicine & Medical Physics	Medicine, General & Internal	Dermatology	Gastroenterology & Hepatology	Genetics & Heredity	Hematology	Clinical Neurology	Neurosciences	Pharmacology & Pharmacy	Psychiatry	Behavioral Sciences	Geriatrics & Gerontology	Primary Health Care	Nutrition & Dietetics	Endocrinology & Metabolism	Rheumatology	Pediatrics	Sport Sciences	Chemistry, Medicinal	Oncology	Infectious Diseases	Emergency Medicine	Allergy	Hematology	Total
Istanbul Univ	64	110	223	63	107	86	93	219	104	96	58	4	36		26	85	172	227	8	36	173	36	25	15	8	2072
Hacettepe Univ	67	95	153	38	79	93	80	95	57	126	19		52		29	76	98	244	45	56	211	34	20	33	6	1806
Ankara Univ	42	62	108	20	105	44	85	33	19	126	25	2	22		29	34	39	120	13	54	82	38	5	10	9	1123
GATA	14	48	109	24	37	11	29	84	42	37	33	2	6		2	39	49	53	19	0	46	12	20	5	4	725
Marmara Univ	30	20	63	8	50	23	14	61	34	59	23	2	10		4	38	65	79	12	13	70	17	3	11	1	710
Gazi Univ	15	28	92	16	25	31	30	34	11	63	16	1	15	1	17	26	34	74	16	59	56	13	9	5	5	692
Dokuz Eylul Univ	10	30	108	19	40	12	20	59	61	29	39	1	8	3	2	23	37	65	8	3	81	9	14	6	1	687
Baskent Univ	15	71	78	32	47	17	36	58	28	19	7	1	6		6	21	27	89	6		81	6	7	3	1	660
Erciyes Univ	15	33	98	12	24	18	21	24	14	29	11	0	5		14	42	29	72	5	10	63	9	10	3	2	563
Ataturk Univ	7	36	125	3	17	15	5	22	20	61	33				15	54	26	21	1	40	29	9	19	2	1	561

Selcuk Univ	20	25	112	8	9	20	16	36	26	46	17	0	7		23	30	14	41	26	20	28	5	17	7	2	556
Akdeniz Univ	17	20	53	12	18	23	22	19	17	26	10		4	1	8	15	25	58	6	21	62	7	32	9	1	481
Yuzuncu Yil Univ	7	13	115	31	17	14	17	29	11	22	22		2	1	7	18	10	45		9	39	5	21	4		457
Ondokuz Mayıs Univ	11	18	69	19	12	14	7	29	40	33	16	1	4		1	13	19	51	6	15	24	19	9	4		434
Uludag Univ	21	36	54	22	23	13	12	24	27	22	13	2	5		4	18	12	42	4	4	45	7	13	7		427
Dicle Univ	3	19	82	6	36	6	6	15	11	56	15		2		5	17	14	25	1	6	41	17	19	2	1	402
Cukurova Univ	9	11	51	5	24	16	28	26	18	22	7	2	5		11	19	15	48	6	2	51	7	6	6	2	391
Kocaeli Univ	9	18	55	11	12	9	17	32	21	29	26	6	2		2	4	16	66	3	3	22	8	9	3		382
Ege Univ	4	18	30	6	28	7	33	23	20	23	17	1	4		9	25	7	46	5	13	48	4	9	2		380
Karadeniz Tech. Univ	7	21	84	11	7	8	17	21	19	9	10				5	15	21	33	3	14	22	4	14	4		348
Gaziantep Univ	8	22	39	3	13	9	21	15	4	18	9	1	7	1	7	7	37	24	2	10	47	4	10	6	2	326
Inonu Univ	7	9	80	6	28	8	3	15	8	45	12		2		11	14	9	23	1	14	10	8	13			323
Firat Univ	10	22	67	7	19	7	2	13	17	31	20	1	1		12	15	34	15		5	8	5	4	3		318
Trakya Univ	5	16	85	3	9	1	12	18	14	10	7	1	2		2	6	25	13	0	5	34	2	16	3		289
Celal Bayar Univ	13	14	38	25	7	7	6	19	10	10	16		4	1	7	8	12	35	2	5	29	5	4	11	3	288
Cumhuriyet Univ	4	5	93	3	16	5	4	14	14	12	14	2	8		3	8	12	14		7	23	11	10	4		284
Osman Gazi Univ	11	12	46	8	3	6	8	20	10	34	3	1	6		2	7	18	29		8	18	4	5	8	3	270
Pamukkale Univ	2	18	36	13	6	8	8	22	19	11	19		5		7	10	15	15	10	4	12	7	14	1	3	263
Yeditepe Univ	8	24	33	5	14	9	4	9	16	34	9		11		4	9	16	13	1	15	12	3	8	4		259
Suleyman Demirel Univ	2	13	61	15	11	5	12	9	10	12	2	3	8		10	19	12	20	2	4	11	5	4	1		249
Adnan Menderes Univ	3	8	41	9	3	6	7	13	13	13	6		5	1	3	9	29	30	2	1	21	7	1	1	5	234
Mersin Univ	9	9	47	5	13	4	5	18	12	16	11		2		5	8	7	29	3	1	14	6	5	4		232

Acibadem Univ	7	10	25	17	10	1	1	33	22	7	7	1	1	3	1	2	6	17	4	1	28	4	11	1	1	230
Harran Univ	3	8	77	10	8	4	5	7	4	17	7				4	10	7	16	3	1	3	5	17	2	1	216
Mustafa Kemal Univ	4	6	58	14	2	3	3	11	7	26	5		2		4	7	3	13	5	6	4	4	5		1	191
Fatih Univ	3	8	54	11	13	2	17	11	6	6	2				2	9	7	17		1	11	1	3	2	2	185
Bulent Ecevit Univ	4	8	47	8	21	4	2	10	8	12	6		2		3	6	4	14	3	2	9	6	5			184
Duzce Univ		6	59	12	2	2	8	11	7	3	13		4			16	6	8	5	1	4	6	11		1	181
Abant Izzet Baysal Univ			31	11	13	4	2	7	9	10	3	1	8		5	4	7	8	6	7	10		6			150
Gaziosman Pasa Univ	1	5	45	11	2	5	1	9	8	2	8		1		1	3	9	11		7		6	5			138
Kirikale Univ	5	7	35	6	3	6	2	11	4	8	3		3		1	4	3	14	5	2	8	2	3	3		138
Afyon Kocatepe Univ	3	8	23	1	7	7	1	8	8	18	3		1	1	1	6	5	9		11	5	2	4			129
Istanbul Bilim Univ	3	7	10	2	3	4	7	24	10	4	3		1		1	3	2	5		1	20		1	1	1	111
Sutcu Imam Univ	1	3	31	6	4	1	4	7	4	9					1	5	6	8	1	2	2	2	1			96
Ufuk Univ	1	4	26	2	5	1	3	7	3	2	4		3			4	11	4	0	1	0	1	1			81
Canakkale Onsekiz Mart Univ	1	4	19	1		3	1	7	3	8	4	0	4		4	2	5		1	3	13					80
Sakarya Univ	2		29	2	3		0	1	2	10	3					1	1	4	7	3	3	1	3			74
Kafkas Univ	2	2	14		2	3	0	6	4	5	1		3		1	2		1	1	1	8	6	7			69
RTE Univ	1	3	17	4	2	3	2	10	7	3	1				1	3				8	2			1		66
Namik Kemal Univ	1	4	14	2	2	3	1	5	2	6	2	1	1		2	7	2	5		3	3	2	1			65
Balikesir Univ		3	8	1	3	1	1	5	1	9	3				4	1		2	1	16	3	1	2			62
Maltepe Univ	1	9	5	3	4	1		8	4	0	7		3			1	1	3			4		3	1	1	59
Dumlupinar Univ		1	8	1	1	1	1	4	3	9	1	2	2					4	1	10	2					49
Adiyaman Univ	1	1	10	1	3	7	2	1	2	4		1			1	1		1		1	7	2		1		43
Yildirim Beyazit Univ	2	1	12		7	1	1	1	3	1						3		5		1	4	2			2	43
Bozok Univ		1	15	1		1		1	0	9		0			2			2	1		3	1	2			37

Koc Univ		3	1				4	8	8	3	3	2							2	1					33	
Ordu Univ			8		2	1		3	5	2					1				3	4		2			29	
Erzincan Univ		1	3		1	1				8	2		2		3				3	1		1			25	
Necmettin Erbakan Univ	5	1	4			0	1	1		1	3			1	3			3							22	
Medipol Univ			2		1	1		2	1	4	1				1			3		3		3			22	
Giresun Univ		1	2						1	3			1		3					4	5				20	
Katip Celebi Univ		2	3				1		0	1	1	0						4			2		1		16	
Ahi Evran Univ			2	1		0			1	1	1		1		1			2	3		0				13	
Yeni Yuzyil Univ	0		2		1	2		0		1			1					0		1	4				12	
Hitit Univ	1		2			2			1	2				1					1	1					10	
Sifa Univ		1							0	0		0	1		2	1									5	
Karabuk Univ			2							1					3										5	
Bezm Alem Univ					2												1								3	
Mevlana Univ			2												1										3	
Izmir Univ							1				1								1						3	
Sitki Kocman Univ		1																							2	
Total	522	1018	3225	587	979	638	749	1346	893	1389	642	40	296	9	333	837	1039	1937	264	554	1681	388	466	190	70	20093

APPENDIX I - Distribution of Surgical Medical Sciences Publications

Univesity	Pathology	Anesthesiology	Cardiac & Cardiovascular Systems	Orthopedics	Surgery	Obstetrics & Gynecology	Otorhinolaryngology	Ophthalmology	Peripheral Vascular	Respiratory System	Critical Care Medicine	Transplantation	Andrology	Cell & Tissue Engineering	Total
Istanbul Univ	32	6	129	27	259	98	43	33	54	20	12	23	5	3	743
Hacettepe Univ	42	6	188	22	123	81	46	33	35	11	8	16		5	617
Baskent Univ	16	13	91	19	143	66	19	28	16	16	11	44		1	484
Ankara Univ	35	8	47	11	116	63	14	19	29	11	3	22	1	9	386
GATA	22	9	78	11	113	40	17	21	18	16	15	16	3	1	380
Marmara Univ	21	4	46	11	91	27	15	6	14	8	3	14			258
Gazi Univ	9	8	45	12	83	27	16	14	12	7	7	11			249
Selcuk Univ	2	10	58	7	52	31	10	18	11	4	6	13	2	0	225
Dokuz Eylul Univ	17	3	27	17	58	33	14	11	8	8	7	5	2	1	210
Erciyes Univ	7	5	74	5	35	28	9	10	26	4	1	6	1		208
Ataturk Univ	14	2	71	7	62	18		4	3	3	2	5	1		193
Inonu Univ	7	4	27	3	55	36	8	19	7	5	3	18	2		191
Akdeniz Univ	27	5	27	3	31	35	3	7	6	11	5	11	1		171
Ondokuz Mayıs Univ	18	1	17	7	68	26	3	5	6	8	4	3			164
Cumhuriyet Univ	1	1	65	1	40	16	12	3	13	8	3	1			162
Dicle Univ	4	1	31	5	47	33	18	12	5	3	1	1	1		161
Yuzuncu Yil Univ	3	2	28	7	44	20	11	16	16	4	1	2	2		156

Yeditepe Univ	4	4	24	4	49	23	11	29	1	2	1	1	1	0	155
Kocaeli Univ	13	11	43	11	38	8	6	8	4	2	2	3	2	2	152
Gaziantep Univ	5	4	36	5	48	22	8	6	9	3	1	4			150
Uludag Univ	11	7	17	6	33	22	16	8	4	7	2	6		1	139
Karadeniz Tech. Univ	7	6	25	4	30	29	13	4	7	6	3	4	1	0	136
Acibadem Univ	3		31	8	58	9	14	4	5	2		3			134
Osman Gazi Univ	1	2	31	5	22	11	26	14	4	3	1	1	1	0	121
Trakya Univ	8	9	32	4	24	11	1	1	9	8	4	2	4		117
Suleyman Demirel Univ	9		26	4	28	22	2	5	11	1		0	1		109
Fatih Univ	6	2	8	4	17	44	8	9	5	3	1	2			108
Kirikale Univ	2	2	8	14	40	12	17	6	2	1	2	1		0	106
Cukurova Univ	15	3	14	4	19	20	12	3	2	3	4	6		0	102
Celal Bayar Univ	4	1	11	4	29	10	14	15	2	6	2		2		99
Duzce Univ	11	2	28	5	12	12	13	3	10	2					97
Pamukkale Univ	3	1	27	11	30	6	2	3	2	5	1	1		2	93
Harran Univ	2	4	13	9	19	25	4	4	6	1			2		87
Firat Univ	6		5	3	14	25	12	5	3	1		3	9	0	84
Bulent Ecevit Univ	7	8	15	4	14	18	4	10	1		2	3			84
Ege Univ	2	4	17	1	19	20	4	6	6	0	2	3			83
Gaziosman Pasa Univ	1		20	2	19	5	11	11	8	1	1	2	1		79
Mustafa Kemal Univ	10	2	21	7	25	5	4	1	3	1			1		79
Abant Izzet Baysal Univ	5	1	15	5	16	16	10	4	4	2					77
Mersin Univ	2	1	8	4	22	10	7	8	1	3	2	6		1	73
RTE Univ	3	3	22	2	17	8	7	2	5	5	1				72
Adnan Menderes Univ	2	1	8	1	20	25	1	4		7		3			71
Maltepe Univ	3		7	3	20	22	4	4	1	4		0			67

Hitit Univ															0
Mevlana Univ															0
Sitki Kocman Univ															0
Total	438	165	1665	338	2227	1208	517	457	441	229	126	275	50	28	8164

TEZ FOTOKOPİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü

Sosyal Bilimler Enstitüsü

Uygulamalı Matematik Enstitüsü

Enformatik Enstitüsü

Deniz Bilimleri Enstitüsü

YAZARIN

Soyadı : KOÇAK

Adı : MURAT

Bölümü : SAĞLIK BİLİŞİMİ

TEZİN ADI : BIBLIOMETRIC ANALYSIS OF CLINICAL MEDICINE PUBLICATIONS IN
TURKEY

TEZİN TÜRÜ : Yüksek Lisans

Doktora

1. Tezimin tamamı dünya çapında erişime açılsın ve kaynak gösterilmek şartıyla tezimin bir kısmı veya tamamının fotokopisi alınsın.
2. Tezimin tamamı yalnızca Orta Doğu Teknik Üniversitesi kullanıcılarının erişimine açılsın. (Bu seçenekle tezinizin fotokopisi ya da elektronik kopyası Kütüphane aracılığı ile ODTÜ dışına dağıtılmayacaktır.)
3. Tezim bir (1) yıl süreyle erişime kapalı olsun. (Bu seçenekle tezinizin fotokopisi ya da elektronik kopyası Kütüphane aracılığı ile ODTÜ dışına dağıtılmayacaktır.)

Yazarın imzası :

Tarih :