

ORIGINAL ARTICLE

Medicine Science 2021;10(1):218-21

Characteristics of orthopedic research originating from Turkey **Ismail Guzel**,  **Serkan Akpınar***Malatya Training and Research Hospital, Department of Orthopedics Surgery, Malatya, Turkey*Received 16 April 2020; Accepted 13 Jun 2020
Available online 17.08.2020 with doi: 10.5455/medscience.2020.04.057Copyright@Author(s) - Available online at www.medicinescience.org

Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

**Abstract**

The present study aimed to highlight the quantity, research type, subject, evidence level, and publication patterns of scientific articles published in Turkey in the last 10 years. All scientific articles related to orthopedics and traumatology in the PubMed database from Turkey during the period from 01.01.2010 to 31.12.2019 were searched. Distribution of the articles based on subjects, journals, publication year, and yearly numbers was organized in tables and illustrated as graphics. The articles were categorized under six main groups: clinical studies, experimental studies, review articles, epidemiological studies, letters to the editor, and technical notes. The quality of the articles was evaluated based on the Oxford Centre for Evidence-Based Medicine System (Centre for evidence-Based Medicine, Oxford University Levels of evidence and grades of recommendation). The impact factor, scope, and indexing of the journals were evaluated using the data in the Journal Citation Report, Thompson Scientific Journal Citation Reports, and National Library of Medicine Report. The study covered 1,873 articles. There were 1,251 clinical studies (250 prospective, 629 retrospective, and 366 case study/case series), 293 were experimental studies (160 animal, 68 biomechanical, 34 cadaver and 31 cell cultures), 140 were review articles, 40 were epidemiological studies and 54 were letters to the editor. The most common subjects of the articles were trauma (n = 411, 23.5%), miscellaneous (basic science, practice management, osteoarthritis and rehabilitation medicine) (n = 331, 17.6%) and sports medicine-arthroscopy (n = 184, 9.8%). Based on the quality, most of the clinical studies were in Level IV (n = 768, 61.3%), followed by Level III (n = 233, 18.6%), Level II (n = 204, 16.3%) and Level I (n = 46, 3.7%). The highest number of articles were published in *Acta Orthopaedica et Traumatologica Turcica* journal (n = 376, 20%), followed by *Joint Diseases and Related Surgery* (n = 310, 16.6%) and *Knee Surgery, Sports Traumatology, Arthroscopy* (n = 48, 2.6%). Although there have been significant scientific advances in the field of orthopedics and traumatology and an increase in the number of relevant scientific publications in Turkey in recent years, the quality of publications seems to be minimal. Turkey is on track to reach the level of countries considered to be advanced in the world of science, and Turkish scientists should make efforts to improve the quality of publications. Science-based investments could foster such an aim.

Keywords: Orthopedics, publication, publication trend, scientific article.**Introduction**

Countries need to develop policies that maximize scientific activities to secure their future and provide comfort for their citizens. That's why countries invest in science and train scientists in parallel with their level of development. The quantity and characteristics of scientific articles in a country are directly proportional to the scientific activities of that specific country [1].

Turkish scientists have been successful in the field of Orthopedics and Traumatology, and many scientific papers they published successfully represented Turkey in the international arena. In this context, the journals *Acta Orthopaedica et Traumatologica Turcica* (AOTT) and *Joint Diseases and Related Surgery* originating from Turkey are two important journals that have

managed to enter the SCI-E index with articles published in the field of Orthopedics and Traumatology.

This study aimed to present the quantity, type of study, subject, evidence level, publication types, and characteristics of scientific articles published in Turkey in the last 10 years.

Materials and Methods

Scientific articles involving orthopedics and traumatology from Turkey in the PubMed database during 01.01.2010-31.12.2019 period were searched. Articles were grouped based on subjects, journals, publication year, and yearly numbers were organized in tables and illustrated as graphics. Subjects of the articles were classified in ten main categories: trauma, pediatric, sports injuries and arthroscopy, adult reconstruction (knee, hip, ankle), vertebrae, tumor (tumor, metabolic diseases, AVN, infection), hand-wrist, foot-ankle, shoulder-elbow and unclassified (basic sciences, osteoarthritis, and other subjects). The article types were classified into six main groups: clinical research articles, experimental research articles, review articles, epidemiological

*Corresponding Author: Ismail Guzel, Malatya Training and Research Hospital, Department of Orthopedics Surgery, Malatya, Turkey
E-mail: dr.ismailguzel@gmail.com

research articles, letters to the editor, and technical notes. Clinical research articles were separated into three main groups of prospective and retrospective studies and case studies/case series. Experimental research articles were of four groups: animal, biomechanical, cadaver, and cell culture studies. The quality of the articles was analyzed using the Oxford Centre for Evidence-Based Medicine System (Centre for evidence-Based Medicine, Oxford University Levels of evidence and grades of recommendation)[2]. In this system, good quality, randomized studies with controls were classified Level I, low quality, randomized studies with controls were Level II, case-control, and retrospectively compared studies were Level III, and case series without a control group or comparison were Level 4. The impact factor, scope, and indexing of the journals were analyzed based on the data in the Journal Citation Report, Thompson Scientific Journal Citation Reports, and National Library of Medicine Report[3,4]. The articles were evaluated by two independent investigators. Conflicting evaluations were resolved by discussion or by taking the opinion of a third researcher. SPSS for Windows software (ver. 15.0) was used for statistical analyses of the data.

Results

Of 1,911 scientific articles evaluated in 01.01.2010-31.12.2019 period, 38 were eliminated since they were not related to orthopedics and traumatology, and a total of 1,873 articles were examined. The number of published articles was low in the 2010-2013 period, but starting with 2014 a major increase was observed. The highest number of articles were published in 2014 ($n = 257$) and the lowest in 2011 ($n = 81$) (Figure 1). During the study period, 1,251 clinical research articles were published, and 629 of them were retrospective, 366 were case study/case series and 250 were prospective. The number of experimental research articles in the surveyed period was 293, and 160 of them were animal studies while 68 were biomechanics, 34 were cadaver and 31 were cell culture studies. There were also 140 review articles, 40 epidemiological research articles, and 54 letters to the editor. In terms of subjects, articles involving trauma were most common ($n = 411$, 23.5%), followed by miscellaneous (basic science, practice management, osteoarthritis and rehabilitation medicine) ($n = 331$, 17.6%) and sports medicine-arthroscopy ($n = 184$, 9.8%) (Figure 2).

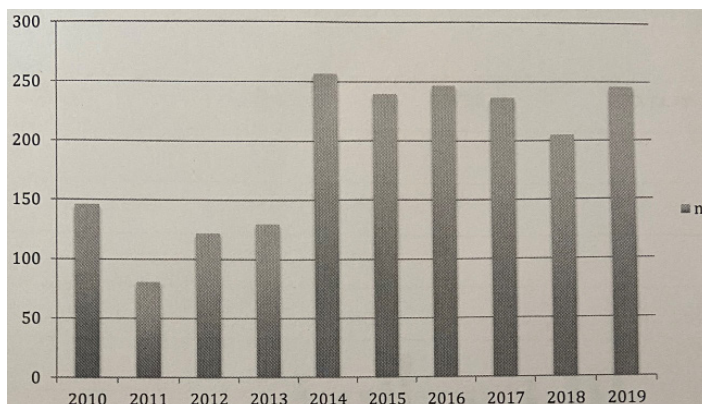


Figure 1. Number of publications per year

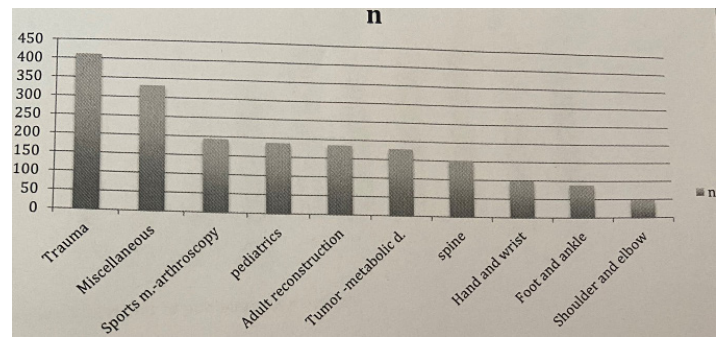


Figure 2. Distribution of article based on subjects

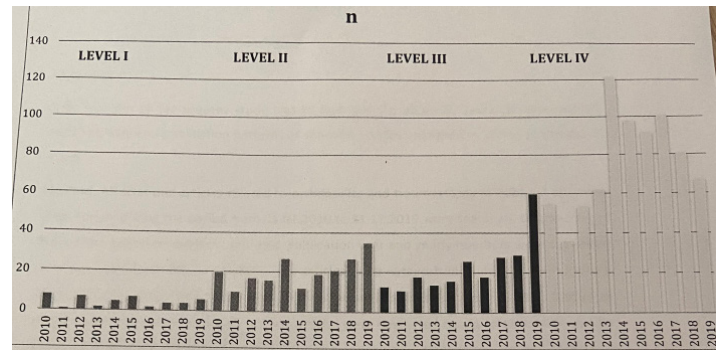


Figure 3. Quality of study designs according to the Oxford Centre for Evidence-Based Medicine System

When it comes to the quality classification of the scientific articles, most of the published clinical studies were Level IV ($n = 768$, 61.3%), followed by Level III ($n = 233$, 18.6%), Level II ($n = 204$, 16.3%), and Level I ($n = 46$, 3.7%). The number of Levels I studies, which represent the best quality, was highest in 2010 ($n = 8$), 2012, and 2015 years ($n = 7$ each) (Figure 3). The journals in which the highest number of articles were published were *Acta Orthopaedica et Traumatologica Turcica* ($n = 376$, 20%), followed by *Joint Diseases and Related Surgery* ($n = 310$, 16.6%) and *Knee Surgery, Sports Traumatology, Arthroscopy* ($n = 48$, 2.6%).

Discussion

In the present study, orthopedics and traumatology scientific articles published in PubMed in the last 10 years were analyzed, and their impacts on international scientific literature were evaluated. Our results showed that the number of publications in the field of Orthopedics and Traumatology has increased successfully. However, the ratio of experimental and Level I and II clinical trials in all publications was very low.

The number of scientific articles in the field of Orthopedics and Traumatology was low in the 2010-2013 period, and a considerable increase occurred after 2013. The highest number was observed in 2014 (257 articles) while the lowest was in 2011 (81 articles) (Figure 1). In a similar study performed in Turkey, Demirtaş et al.[5] surveyed the scientific articles in *Acta Orthopaedica et Traumatologica Turcica* (AOTT) journal in the 2006-2015 period. They observed an increase until the year 2009, followed by a considerable decrease until 2013, and an increase

Table 1. Distribution of articles according to the journals

Journal	n	%	Impact Fctor*	Scope **, ***
Acta Orthopaedica et Traumatologica Turcica	376	20.0	0.896	Index Medicus MEDLINE PubMed SCI-E Essential Science Indicators
Joint Diseases and Related Surgery	310	16.6	1.058	Index Medicus MEDLINE PubMed SCI-E Essential Science Indicators
Knee Surgery, Sports Traumatology, Arthroscopy	48	2.6	3.210	Index Medicus MEDLINE PubMed SCI-E Current Contents- Clinical Medicine Essential Science Indicators
Ulus Trauma Emergency Surgery	44	2.3	0.643	Index Medicus MEDLINE PubMed SCI-E Essential Science Indicators
Journal of Pediatric Orthopaedics	29	1.5	2.046	Index Medicus MEDLINE PubMed SCI-E Current Contents-Clinical Medicine Essential Science Indicators
Archives of Orthopaedic and Trauma Surgery	27	1.4	1.973	Index Medicus MEDLINE PubMed SCI-E Biological Abstracts BIOSIS-Previews Current Contents-Clinical Medicine Essential Science Indicators
European Journal of Orthopaedic Surgery & Traumatology	26	1.4	0.180	Index Medicus MEDLINE PubMed
International Journal of Surgery Case Reports	22	1.2	0.620	Index Medicus MEDLINE PubMed DOAJ
Orthopedics	21	1.1	1.608	Index Medicus MEDLINE PubMed SCI-E Current Contents- Clinical Medicine Essential Science Indicators
Case Reports in Orthopedics	21	1.1	-	Index Medicus MEDLINE PubMed PMC DOAJ
Others (< 20)	949	50.6		
TOTAL	1873	100		

* Journal Citation Report ** Thompson Scientific Journal Citation Reports *** National Library of Medicine Report

again until the end of 2015. We surveyed all journals published in Turkey and indexed in Pubmed. Our findings were similar to those of Demirtaş et al until the year 2015. The increase after the year 2013 indicated that scientific activities increased considerably in Turkey. The number of scientific articles remained similar until the end of 2019, and a major decrease was not observed.

Prospective studies that are considered to be better quality compared to other studies constituted about 20% of all clinical studies, while 15.6% of them were experimental studies. The number of retrospective studies increased in the last ten years during which prospective studies did not have a considerable increase. In a similar study, Demirtaş et al. found that 2.5% of the studies originating from Turkey were published in the AOTT journal and that percentage increased to 7.4 in the 2011-2015 period[5]. In the same study, it was mentioned that a statistical increase was not observed in the number of prospective studies until the year 2015. Koca et al.[6] surveyed Orthopedics and Traumatology theses and publication patterns in Turkey. They revealed that 8.6% of the theses were Level I prospective studies, 5.8% were Level II prospective studies and 25.6% were experimental studies. They also found that only 16% of the theses were published and made a better contribution to science. The journals have impact value based on the citations they received. Yalçınkaya et al.[7] evaluated studies that originated in Turkey. They observed that most study types were retrospective, observational, and case reports. Obremskey et al. mentioned that Level 1 and 2 publications receive more citations, and consequently, they guide other scientific studies[8]. Reich et al. mentioned that Level I, Level II, and III publications could be published (in decreasing order) in journals that guide the scientific studies while publication chance of Level IV publications is very low [9]. Because the journals with high impact value which guide the science attach more importance to experimental, Level 1, and 2 clinical studies, Turkey should promote scientists and implement scientific policies to produce this kind of research.

The most commonly studied subject was trauma (23.5%), followed by miscellaneous (basic science, practice management, osteoarthritis, and rehabilitation medicine) (17.6%) and sports medicine-arthroscopy (9.8%) (Figure 2). Such a distribution of topics is in line with other studies carried out in Turkey. However, there are some discrepancies compared to international studies in the literature. In a study conducted in Brazil, the most common studies involved shoulder/elbow (13.8%), followed by the knee (12.6%) and trauma (10.7%)[10]. The frequency differences could have been caused by the method used for the classification of articles. A relatively low number of studies in the shoulder/elbow area points to the need for studies in this field in Turkey.

More than one-third of the Orthopedics and Traumatology studies originating in Turkey was published in *Acta Orthopaedica et Traumatologica Turcica* and *Joint Diseases and Related Surgery*, two Turkish journals indexed in Science Citation Index-

Expanded (SCI-E). These two journals host a considerable number of successful scientific articles. Knee Surgery, Sports Traumatology, Arthroscopy ranks third with a share of 2.6%. This journal boasts with an impact value of 3.21 and hosts the most successful studies originating in Turkey, but the number of these studies is limited. Increasing the number of good quality publications in Turkey could allow these high-impact journals to publish more of them.

Although there have been considerable scientific advances and increased publications in the field of orthopedics and traumatology in Turkey during the recent years, the quality of publications (a journal where they were published, the number of citations they received, whether they had patent output, etc.) is still minimal. Turkey, on her track to reach the level of countries considered advanced in the scientific world, needs to make efforts to improve the quality of publication of her scientists and to make science-centered investments.

Conflict of interests

The authors have no conflicts of interest to declare.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Ethical approval for this study was obtained from Inonu University Clinical Research Ethics Committee (Date: 23.12.2020, protocol number: 2020/209).

References

1. Bordons M, Zulueta MA. Evaluation of the scientific activity through bibliometric indices. *Revista Espanola de Cardiologia*. 1999;52:790-80.
2. American academy of orthopaedic surgeons. Levels of evidence and grades of recommendations. <http://www2.aaos.org/bulletin/apr05/fline9.asp> accessed date January 21, 2020
3. Thompson Scientific. J Citation Reports. <http://science.thomsonreuters.com/cgi-bin/jmlst/jlresults.cgi> accessed date January 21, 2020
4. National Library of Medicine Report. http://locatorplus.gov/cgi-bin/Pwebrecon.cgi?PAGE=sbSearch&SEQ=20160106161608&PID=-jITHFzweZHyelE17_sk3TMF4NlrR accessed date January 21, 2020
5. Demirtaş A, Tutak Y, Duymus TM, et al. Change in the impact of Turkish Orthopedics and Traumatology on international scientific literature. *Medeniyet Med J*. 2018;33:75-81.
6. Koca K, Ekinci S, Akpınar S, Gemci MH, Erşen Ö, Akyıldız F. An analysis of orthopaedic theses in Turkey: Evidence levels and publication rates. *Acta Orthop Traumatol Turc*. 2016;50:562-6.
7. Yalçınkaya M, Bagatur AE. Articles published in *acta orthopaedica et traumatologica turcica* between 2003-2012: content, characteristics and publication trends. *Acta Orthop Traumatol Turc*. 2014;48:576-83.
8. Obremskey WT, Pappas N, Attallah-Wasif E, et al. Level of evidence in orthopaedic journals. *J Bone Joint Surg Am*. 2005;87:2632-8.
9. Reich MS, Shaw J, Barrett I, et al. Level of evidence trends in the *J Bone and Joint Surgery*, 1980-2010. *Iowa Orthop J*. 2014;34:197-203.
10. Ejnisman L, Gomes GS, de Oliveira RG, et al. Publication rates of papers presented at the Brazilian Orthopedic Meeting. *Acta ortopedica brasileira*. 2013;21:285.