



# A Bibliometric Analysis of Turkey's Contribution to Bone Health Literature from an Endocrinologist Perspective

## Türkiye'nin Kemik Hastalıkları Literatürüne Katkısını Endokrinolojik Çerçeveden Değerlendiren Bibliyometrik Bir Analiz

Ceyla Konca Değertekin, Özlem Turhan İyidir\*, Dilek Gogas Yavuz\*\*

Department of Endocrinology and Metabolism, Ufuk University Faculty of Medicine, Ankara, Turkey

\*Department of Endocrinology and Metabolism, Başkent University Faculty of Medicine, Ankara, Turkey

\*\*Department of Endocrinology and Metabolism, Marmara University Faculty of Medicine, İstanbul, Turkey

### Abstract

**Objective:** To analyze the trend of Turkish publications related to bone health with respect to global publications and to determine the relative contribution of endocrinologists to metabolic bone disease literature.

**Material and Methods:** Publications related to bone health up to and including the year 2017 were retrieved from the "Web of Science" (WoS) and "Türkiye Atf Dizini" (TAD) database using metabolic bone disease related MeSH terms. Excel (v15.30) and Endnote X8 were used to summarize the bibliometric features, including the number of publications, authors, their affiliations, and contributing countries. Keywords were divided, for a detailed analysis, into three clusters: osteoporosis, parathyroid, and vitamin D-related.

**Results:** A total of 1.880.666 papers were retrieved from WoS globally and, of those, 21.165 (1.13%) were published from Turkey. Of the papers published from Turkey, 3.0% were primarily contributed by endocrinologists. The relative contribution of endocrinology to osteoporosis-related (4.6% vs. 1.5%), parathyroid-related (23.7% vs. 5.3%), and vitamin D-related (23.7% vs. 5.3%) publications was higher for articles originating from Turkey compared to the global data. Endocrinology was among the top five specialties contributing to Turkish metabolic bone disease literature indexed in WoS and TAD.

**Conclusion:** Turkey has a less than expected rate of research output in terms of metabolic bone disease. The relatively higher contribution of endocrinology to that effort is promising. Supporting bone research might accelerate the efforts of Turkish researchers in the field of metabolic bone health.

**Keywords:** Metabolic bone disease; bibliometric analysis; Turkey; endocrinology; osteoporosis

### Özet

**Amaç:** Bu çalışmada, metabolik kemik hastalıkları konusunda Türkiye'den yapılmış olan araştırmaların dünya literatürü ile kıyaslandığındaki durumunun ve bu bilimsel üretimde endokrinologların yerinin değerlendirilmesi amaçlanmıştır.

**Gereç ve Yöntemler:** 2018 yılına kadar "Web of Science" (WoS) ve "Türkiye Atf Dizini" (TAD) veri tabanlarında indekslenmiş yayınlar, metabolik kemik hastalıkları ile ilgili olan MeSH anahtar kelimeleri kullanılarak tarandı. Elde edilen bibliyometrik verileri analiz etmek için Excel (v15.30) and Endnote X8 programları kullanıldı ve yayın sayısı, yazar bilgisi, yazarların branş ve kurumları, yayının yapıldığı ülke verileri değerlendirmeye alındı. Anahtar kelimeler alt gruplara ayrılarak; osteoporoz, paratiroid ve vitamin D ile ilişkili yayınlar olarak da ayrıca incelendi.

**Bulgular:** WoS veri tabanında tüm dünyadan 1.880.666 yayın bulunduğu ve bunların 21,165 (%1,13)'ünün Türkiye'den yapıldığı ve Türkiye'den yapılan yayınların %3,0'ünün da endokrinologlar tarafından yönetildiği bulundu. Osteoporoz (%4,6'ta karşı %1,5), paratiroid (%23,7'ye karşı %5,3) ve vitamin D ilişkisi (%23,7 vs. %5,3) olarak tanımlanan yayınlarda endokrinologların katkısının Türkiye için tüm dünya rakamlarının üzerinde olduğu görüldü. Hem WoS hem de TAD veri tabanlarında endokrinolojinin, metabolik kemik hastalıkları literatürüne en çok katkı yapan ilk beş branş içerisinde olduğu saptandı.

**Sonuç:** Türkiye'den metabolik kemik hastalıkları konusunda yapılan toplam yayın sayısının beklenenin altında olduğu düşünülmektedir. Bu bilimsel üretimde endokrinologların hatırı sayılır bir katkısı var gibi durmakla birlikte, metabolik kemik hastalıkları araştırmalarına endokrinoloji camiası başta olmak üzere ilgili tüm branşların vereceği bilimsel desteğin artırılmasının yayın sayısı ve kalitesinin yükseltilmesinde önemli rol oynayacağı görülmüştür.

**Anahtar kelimeler:** Metabolik kemik hastalıkları; bibliyometrik analiz; Türkiye; endokrinoloji; osteoporoz

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**Address for Correspondence:** Ceyla Konca Değertekin, Ufuk University Faculty of Medicine, Department of Endocrinology and Metabolism, Ankara, Turkey  
**Phone:** +90 312 2044000 **E-mail:** ceylakonca@yahoo.com

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## Introduction

Metabolic bone health is an important but often neglected area in daily medical practice. The growing burden of osteoporosis due to the aging of the population and very high prevalence of hypovitaminosis-D alarm that proper steps should be taken for the benefit of public health. The data for this action plan are derived from the research literature. Thus, the structured knowledge of the current literature on bone health is crucial for planning future scientific efforts.

Bibliometric analysis is a helpful tool for obtaining information regarding the current state of research in different areas of medicine. It could reveal the research trend in a certain field and evaluate academic production of a country or certain specialty or even individual researchers (1).

Owing to the multifunctional dynamics of the bone tissue, the term "metabolic bone disease" covers a broad spectrum of diseases that are related to many different specialties in medicine. We, as endocrinologists, are one of the core specialists working in the field of metabolic bone health.

Therefore, in this study, we aimed to analyze the scientific output on metabolic bone diseases in our country (Turkey), along with the subspecialty, endocrinology, in comparison to global trends through a bibliometric approach.

## Material and Methods

A bibliometric analysis was performed using the ISI Web of Science (WoS) and "Türkiye Atıf Dizini" (TAD). Endnote X8 was used for WoS database analysis. The time period for data analysis was considered up to and including 2017. The publications from 2018 were not included due to incomplete availability at the time of analysis. The search terms were based on Medical Subject Headings (MeSH) terms on WoS and the corresponding Turkish translations for TAD. The MeSH terms were inserted into the search field to perform a "topic" search. The search terms were as follows:

theme=(*"Bisphosphonate"* [MeSH] OR *"Bone"* [MeSH] OR *"Bone fracture"* [MeSH] OR *"Bone mineral density"* [MeSH] OR *"Calcium"* [MeSH] OR *"Denosumab"* [MeSH] OR *"Hyperparathyroidism"* [MeSH] OR *"Hypoparathyroidism"* [MeSH] OR *"Hypophosphatemia"* [MeSH] OR *"Osteoblast"* [MeSH] OR *"Osteocalcin"* [MeSH] OR *"Osteoclast"*

*[MeSH]* OR *"Osteogenesis imperfecta"* [MeSH] OR *"Osteomalacia"* [MeSH] OR *"Osteoporosis"* [MeSH] OR *"Osteoprotegerin"* [MeSH] OR *"Paget disease of bone"* [MeSH] OR *"Parathyroid"* [MeSH] OR *"RANK"* [MeSH] OR *"Rickets"* [MeSH] OR *"Teriparatide"* [MeSH] OR *"Vitamin D"* [MeSH])

The topic search was then subdivided into three clusters for theme MeSH terms for a detailed analysis for "osteoporosis-related", "parathyroid-related" and "vitamin D-related" papers as follows:

**Osteoporosis-related:** theme= (*"Osteoporosis"* [MeSH] OR *"Bone mineral density"* [MeSH] OR *"Calcium"* [MeSH] OR *"Teriparatide"* [MeSH] OR *"Bisphosphonate"* [MeSH] OR *"Denosumab"* [MeSH] OR *"Bone fracture"* [MeSH])

**Parathyroid-related:** theme= (*"Hyperparathyroidism"* [MeSH] OR *"Hypoparathyroidism"* [MeSH] OR *"Hypophosphatemia"* [MeSH] OR *"Parathyroid"* [MeSH])

**Vitamin D-related:** theme= (*"Vitamin D"* [MeSH] OR *"Osteomalacia"* [MeSH] OR *"Rickets"* [MeSH])

We refined the search for Turkey by using "Turkey" in the country keyword followed by the aforementioned MeSH terms as a search topic.

All types of publications were included in the analysis. For simplification of categorization, publications were classified into four groups: original articles, reviews, case reports and short reports (including editorials, letter to the editors, others...). No language restrictions were employed. The outcome variables included document type, country of origin, publication date, source title, authors and authors' specialty, and institutions. The data were retrieved from WoS and TAD databases were imported into Microsoft Excel for analysis. The researchers manually cleaned and analyzed the data in Excel and compiled the following information: (a) total number of papers published globally and from Turkey; (b) relative contribution of endocrinologists to research productivity globally and from Turkey; (c) detailed analysis of specialties' contributions to papers indexed in WoS and from Turkey between years 2011–2017. A flowchart summarizing the production steps is given in Figure 1. The study was carried out in accordance with the principles of the Declaration of Helsinki.

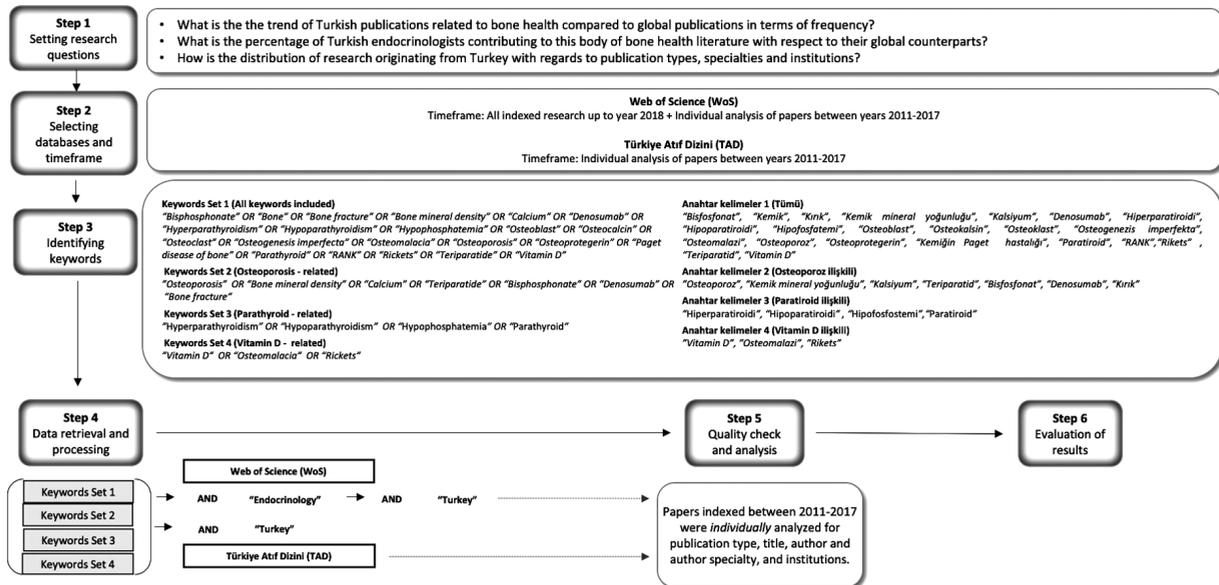


Figure 1: The stepwise approach applied in this study.

## Results

The total number of documents retrieved from WoS in the field of metabolic bone disease up to and including the year 2017 was 1,880,666, without specifying the name of any country. When "Turkey" was used as a county code, the number of articles retrieved at the same time period was 21,165, which was 1.13% of the global research productivity related to metabolic bone disease. The first article published globally on metabolic bone disease was in 1784 at London Medical Journal and the oldest Turkish article dated back to 1987 and was published in Archives of Otorhinolaryngology. Among the documents published globally, 20,699 (1.1%) were led by specialists in endocrinology, while 644 (3.0%) of the papers published from Turkey were led by endocrinologist. Clustering of the keywords retrieved that, of the 817,007 "osteoporosis-related" publications worldwide, 12,376 (1.5%) were primarily led by endocrinologists while the relative contribution of endocrinology was higher for parathyroid-related [2,532 (5.3%) out of 47,892] and vitamin D-related [4,405 (5.3%) out of 83,514] publications. When the same analysis was applied to papers from Turkey, the relative contribution of endocrinologists was 4.6% (330 out of 7,146) for osteoporosis-

related, 23.7% (129 out of 545) for parathyroid-related, and 18.4% (207 out of 1,127) for vitamin D-related publications.

When the research output from Turkey indexed in WoS between years 2011–2017 was examined in more detail, we had a clear picture on the distribution of specialties and types of articles. The top five research specialties in the 1334 documents on metabolic bone diseases published from Turkey were Internal Medicine (n=241, 18.0%; including Internal Medicine subspecialties such as endocrinology), Dentistry (n=217, 16.3%), Pediatrics (n=214, 16.0%), Orthopedics (n=112, 8.4%), and Physical Therapy and Rehabilitation (n=98, 7.4%) while the stand-alone contribution of Endocrinology was 6.8% (n=90). The majority of the articles published from Turkey during that time period were original articles (n=1,058, 78.8%), followed by case reports (n=192, 14.3%), short reports (n=64, 4.8%), and reviews (n=28, 2.1%).

We performed a similar kind of analysis for TAD for publications originating from Turkey between years 2011-2017 and retrieved 628 publications. The top five research specialties were Physical Therapy and Rehabilitation (n=151, 24.0%), Pediatrics (n=89, 14.2%), Endocrinology (n=79, 12.6%), Biochemistry (n=31, 4.9%), and Orthopedics

(n=30, 4.8%). The type of article distribution was as follows: original articles (n=319, 50.8%), reviews (n=201, 32.0%), and case reports (n=108, 17.2%).

## Discussion

In this study, we investigated the global and local trends in metabolic bone disease literature with respect to the role of endocrinology. We preferred WoS database owing to its high volume and coverage for mining worldwide data and TAD for analyzing local publication trends. Although the quality and quantity of research indexed might differ from one database to another, WoS remains one of the best available tools for analyzing global data.

Bibliometric analysis is one of the ways to evaluate the research performance on a specific area of medicine or to analyze the rate and quality of scientific output of a certain group of researchers. We believe that it is vital for the medical authorities of a country to know where they stand in the area of scientific production in order to refine where they should head to in the future. That information gained from the bibliometric analysis may even be used to formulate policy regarding research funding (1).

Our analysis showed that Turkey has a stable but low level of contribution to metabolic bone disease literature. To the best of our knowledge, this is the first bibliometric study from Turkey on metabolic bone health. A comprehensive bibliographic analysis by Sweileh et al. analyzed the research trends in the field of osteoporosis in 21 Arab countries and 3 Middle Eastern non-Arab countries, including Israel, Turkey, and Iran (2). They found that the leading country in osteoporosis research was the United States of America, which contributed to 33.82% of all publications. They also found that Turkey ranked 16<sup>th</sup> while Israel and Iran ranked 24<sup>th</sup> and 31<sup>st</sup>, respectively, in terms of rate of total publication in osteoporosis research. It is well known that the rate and quality of scientific research is a direct reflection of gross domestic product (GDP) per capita of a country and the share of GDP spent on research and development (3). Thus, funding issues, scarcity of translational laboratory setups,

and lack of scientific collaborations might be the underlying issues responsible for the less-than-expected publication production rate in our country.

We also investigated to what extent the Turkish endocrinologists have contributed to the analyzed field of research. The rate of Turkish endocrinologist leading the publications was similar to the global rates. However, when the publications were sub-classified, the contribution of endocrinologist was higher for osteoporosis-related articles and even higher for parathyroid-related and vitamin D-related articles.

A more detailed analysis showed that the most frequent article type submitted from Turkey was original articles and specialties as dentistry and physical therapy and rehabilitation made significant contributions.

## Study Limitations

Since the detection of publications was MeSH term based, inappropriate choices of keywords might misclassify the papers.

Most of the publications involved a collaboration of researchers from different specialties. To enable a specialty classification for publications, only the first author's specialty was considered in the analysis. Incomplete description of the affiliation might have led to errors of specialty classification.

Articles published in non-WoS and non-TAD journals were not included.

## Conclusion

Turkey has a low rate of research output in terms of metabolic bone disease. The relatively higher contribution of endocrinology to that effort is promising. We would like to suggest that supporting research with international and national collaborations and yielding higher impact articles might accelerate the efforts of Turkish researchers in the field of metabolic bone health.

## Source of Finance

During this study, no financial or spiritual support was received either from any pharmaceutical company that has a direct connection with the research subject or from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

### Conflict of Interest

There is no conflict of interest to disclose between the authors and/or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, shareholding and similar situations in any firm.

### Authorship Contributions

Idea/Concept: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Design: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Control/Supervision: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Data Collection and/or Processing: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Analysis and/or Interpretation: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Literature Review: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas

Yavuz; Writing the Article: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Critical Review: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; References and Funding: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz; Materials: Ceyla Konca Değertekin, Özlem Turhan İyidir, Dilek Gogas Yavuz.

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